

Digital Markets and UX: Case Studies in SFIA in Higher Education

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Two case studies are combined here, to illustrate generic challenges in embedding Skills Framework for the Information Age (SFIA) competency statements in higher education, in particular where learners' intended job roles lack formal codification. The paper describes the process of gaining university quality acceptance for a masters-level module (Digital Markets) based on SFIA competency statements, and on the first running of the module. This provides a mapping of SFIA levels to higher taxonomies of learning, and illustrates how both students and programme leaders construct degree courses. Positive reactions are reported from students, external industry participants, and the external examiner. The paper includes a summary of a process, led by a BCS Specialist Group, to define both competency and courses to meet the demand for the relatively new skill of User Experience (UX). UX Competency Framework (UXCF) process has held, so far, two workshops to start to design relevant academic courses.

UX, SFIA, Digital Markets, Competency in HE.

1. INTRODUCTION

These case studies explore the issues in embedding SFIA competency statements in masters-level teaching, and identifying new skills for SFIA, based on a combination of practitioner roles and the courses to prepare for these roles. This paper first reviews the development of User Experience (UX) as an area of competency, before summarising the creation of the Digital Markets module, placing it in the context of a series of workshops to define UX roles and the knowledge and understanding required for them.

Background: UX and BCS

User Experience (UX), as a discipline, arguably has grown out of the **Usability** sub-specialism of Human-Computer Interaction (HCI), itself part of a longer tradition of **Human Factors** within **Computing**. UX also grows out of ergonomics, psychology, and marketing. It looks at people's engagement with technology and services, and seeks to ensure that their experience of using the technology is not only problem-free, but also exceeds expectations, delights the user and thus becomes valued by that user. Particularly in an online world, good UX is fundamental to fitness for purpose. There is a global shortage of these skills, and senior salaries exceed £100k. Clearly, UX has aspect of multi-, inter-, and trans-disciplinarity. It is difficult to pigeonhole into the work of a specific sector skills council, though it is an important part of the future of Computing and a key area for BCS, The Chartered Institute for IT.

In 1984, BCS calved one of the world's first specialist groups in HCI, variously known through the years as BCS-HCI, British HCI Group and now

Interaction SG, which the author chaired 2009-2011. After a special edition of Computer Bulletin, this group launched in 1989 one of the first academic journals in the field, **Interacting with Computers** (IwC), which retains a high impact factor to this day. The SG's annual conference and UsabilityNews web portal also have global impact.

The SG worked with the UK government to produce Usability Now (1989), a Department of Trade & Industry (DTI) initiative to embed usability in UK software. Many would argue that the industry is yet to fulfil these values. By the turn of the century, the group worked with the E-Envoy to ensure accessibility in public websites (Office of the e-Envoy, 2003). Members of the group executive committee and contributed to iterations of SFIA and SFIAplus, resulting in an increased number of usability roles being recognised from SFIA v3 onwards, and this and earlier experiences are summarised elsewhere (McEwan, 2009b). Most recently SFIA v5 (SFIA Foundation, 2011) is the first version to use UX in its skill definitions, shifting the focus from "non-functional requirements" (particularly a misnomer, from a cognitive ergonomics point of view) towards a more holistic understanding of the needs and the experience of the user, in skills such as:

- User experience analysis (UNAN);
- Ergonomic design (HCEV);
- User experience evaluation (USEV);
- Human factors integration (HFIN).

For example, the latter is defined as:

Achievement of optimum levels of product or service usability, by ensuring that project and enterprise activities take account of the user experience.

UX Competency Workshops

On behalf of the SG, the author led two national workshops, UXCF2010 in London, and UXCF2011 in Newcastle. UXCF2010 attracted around 40, mainly industry, participants and sought to understand roles and organisational processes in the fast-developing field of UX. While some of these roles are recognisably part of SFIA, others are not, nor are they adequately defined in national occupation standards (NOS) such as those by e-skills, Skillset or CCDesign.

UXCF2011 extended the materials produced in the first workshop in a smaller event involving three academics who design relevant BSc/MSc courses, and three senior UX professionals, supported by other interested parties. Most had contributed to and/or reviewed the recent SFIA revisions. We reviewed an example set of modules against typical UX roles to identify gaps, and to evaluate how well the new module discussed here, IMD11108 Digital Markets, fills any gaps. The second half of this paper describes the UXCF activity in more detail.

2. CASE STUDY 1: DIGITAL MARKETS

This section describes the first experiences of running a masters-level module, IMD11108 Digital Markets, which was written explicitly to use learning outcomes based on SFIA competency statements. This module addresses UX in the sense that it focuses on entrepreneurship and innovation from a Human-Centred Design (HCD) perspective as highlighted in (McEwan, 2009a). Both that paper and this module grew out contrasting different approaches to innovation, in particular what the OECD term “non-R&D innovation” (OECD, 2002) (OECD, 2006). Such innovation focuses on user-driven innovation, ie demand-led rather than “marketing-push”.

Quality Approval

The first challenge was to gain university quality acceptance for a module based on SFIA statements. The module itself was not created for the sake of delivering competency. A university would be unlikely to accept this as the sole rationale, particularly at Masters-level. The main driver is a growing awareness amongst local employers that after technical skills and the trends of the last ten years to seek better “soft skills” in graduates, there is an additional third requirement missing, that of business awareness, entrepreneurship and commercial pragmatism. Initially our institution saw this as part of the

definition of soft skills, alongside time management, project management, and communication skills. We have come to see that if these soft skills are either about self-direction or outwards communication, this third strand of skills and understanding is more about empathy with others and appreciation of the economic context.

The module descriptor runs to several pages (McEwan, 2011), but the key points investigated here are the Learning Outcomes (LOs). These are the basis of our quality system: all assessments are moderated against the LOs, and all teaching events and directed study are designed to be necessary and sufficient for students to achieve the learning outcomes.

Matching Levels and Breadth

The first consideration of the module was in March 2009. The first task was to contrast the language of the different skills levels within SFIA with the required vocabulary of module accreditation at levels 10 (honours undergraduate) and 11 (Masters-level) of the Scottish Credit and Qualifications Framework (SCQF)

| | |
|----|---|
| 10 | Accurately assess; adapt; analyse; anticipate; appraise; argue; arrange; assemble, attribute; calculate; categorise; classify; combine; compare; compose; conclude; connect; construct; contrast; create; critically reflect; criticise; defend; derive; design; devise; develop; differentiate; discriminate; distil; distinguish; examine; experiment; extract core issues; formulate; generalise; hypothesise; infer; integrate; invent; make effective use of; manage; modify; organise; précis; prioritise; propose; reconstruct; separate; substitute; synthesise; test; validate |
| 11 | Analyse; appraise; argue; challenge; conceptualise; conclude; convince; critically appraise; critically assess; critically engage with; critically explore; critically reflect; critique; debate; defend; discriminate; drawn conclusions; engage in critical dialogue; estimate; evaluate; examine the impact; examine the elements of; exercise appropriate judgment; generate ideas; hypothesise; judge; justify; plan; predict; produce; rate; rationalise the use; recommend; resolve; review; test |

Figure 1: "Acceptable" verbs in SCQF10 and SCQF11 learning outcomes

Our experience has been that the language in level 10 is found between SFIA levels 4 and 5, and that of level 11 at SFIA levels 5 or 6. Although the question has been asked at open forums, there appears to be no definitive mapping between SFIA levels and university learning taxonomies. A typical response is that higher level roles within SFIA require not only knowledge and understanding (as delivered in a degree), but practical experience (seen as not delivered in a degree). One might infer that universities educate at a level well above initial graduate jobs, and that employers are investing in the proven potential of these graduates to progress over 3-5 years to professional roles.

Our experience was that a single SFIA skill appears to be too narrow a focus for a 200 hour learning experience, and thus two related SFIA skills Emergent Technology Monitoring (EMRG) and Innovation (INOV) were mined to provide sufficient breadth for IMD11108. The relevant

statements for SFIA levels 4, 5, 6 in EMRG are (with key points **highlighted**):

"Maintains awareness of opportunities provided by new technology to address challenges or to enable new ways of working. Within own sphere of influence, works to further organisational goals, by the use of emerging technologies and products. Contributes to briefings and presentations about their relevance and potential value to the organisation". (EMRG4)

"Monitors the market to gain knowledge and understanding of currently emerging technologies. Identifies new and emerging hardware and software technologies and products based on own area of expertise, assesses their relevance and potential value to the organisation, **contributes to briefings** of staff and management".(EMRG5)

"Co-ordinates the identification and assessment of new and emerging hardware, software and communication technologies, products, methods and techniques. Evaluates likely relevance of these for the organisation. Provides regular briefings to staff and management".(EMRG6)

The language of learning outcomes (LOs) is traditionally more concise. For this module, the following LOs were mapped onto EMRG5, although LO5 goes slightly beyond (as highlighted).

- LO4 Monitor technology markets to gain knowledge and understanding of currently emerging technologies (EMRG5).
- LO5: Identify new and emerging hardware and software technologies and products, assess their relevance and potential organisational value **and brief** staff, management and investors (EMRG5).

Similarly, Innovation (INOV) provided the basis for the other learning outcomes. Only two levels currently exist for this –

INOV5: "Actively monitors for, and seeks, opportunities, new methods and trends in IT capabilities and products to the advancement of the organisation. Clearly articulates, and formally reports their benefits."

INOV6: "Recognises potential strategic application of IT, and initiates investigation and development of innovative methods of exploiting IT assets, to the benefit of organisations and the community. Plays an active role in improving the interface between the business and IT."

"Monitoring" and "reporting" were judged insufficient to meet SCQF level 11, being more typical of the investigation that an Honours Project student might carry out (SCQF level 10). Thus EMRG6 was the basis for the three other LOs:

- LO1: Recommend potential strategic application of IT in the digital marketplace (INOV6).
- LO2: Work in a group to exploit IT assets in an innovative way, to the benefit of organisations and/or the community. (INOV6).
- LO3: Conceptualise ways to improve the interface between the business (or organisation) and IT. (INOV6).

Other SFIA roles considered in this exercise include Human Factors Integration (HFIN). The UX dimension is notably missing from the other roles discussed, but the HFIN level statements don't fit the LOs either. The HFIN skill **Overview** is more relevant and thus provides a backdrop to the module:

Achievement of optimum levels of product or service usability, by ensuring that project and enterprise activities take account of the user experience.

The module was accepted at the second submission to the Faculty Quality process, subject to amendments. One such amendment was to clarify the kind of job roles that the learning outcomes would lead to. This information is fairly vague, even in SFIAplus, and the following was proposed to gain acceptance:

"This module helps prepare learners for the following roles in the Skills Framework for the Information Age (SFIA): INOV6, EMRG5, HFIN5. These roles are found in digital media innovation and new product development teams in larger organisations and relevant job titles include: Digital Media Developer/Designer within an Innovation Team or New Product Development team, User Experience Developer/Designer/Manager, Imagineer (a Disney Corp. term), Human-centred Designer. This module will also support a potential digital media entrepreneur to develop their concept."

Attracting Students

Once accepted, the module then also had to be made attractive to students - it was first designed in 2009 but the first mandatory running for the integrated masters (MEng) programmes was not until 2011-12. In the meantime it was available as an option for other postgraduates, but there was insufficient demand until Oct-Dec 2011. The resulting performance was slightly above average for that cohort. Some details of the first instance now follow; the reactions (quite positive) of students, external industry participants, and the external examiner are summarised at the end of this section.

Learning Teaching and Assessment Approach

Our institutional policies require each learner to receive a detailed module handbook, and here are a few key sections from this, to give a sense of the module.

Table 1: Time Management advice given to students

| | | |
|-------------|----------------------------|---|
| weeks 2-3 | Heavy (20 hrs per week) | You have 12 hours of classes and a great deal of directed study to do, meaning you will likely work more on this module than other modules. |
| weeks 4-9 | Moderate (12 hrs per week) | No classes - 5 short tutorial meetings: you will be focused on your individual coursework (due week 9) and starting to develop your group for the second coursework. Your only classes will be some individual supervision meetings and then short group meetings with the module leader to discuss group formation and objectives. |
| weeks 10-12 | Heavy (20 hrs per week) | 18 hours of classes: you will prepare in a group for, and give, a 15 minute Dragon's Den type pitch for your concept |
| Weeks 13-15 | Light (10 hrs per week) | Completion of final 1500-word paper reflecting on the group experience |

Informing the students about SFIA

The following statements supplied to students suggest we assume little awareness of SFIA by students (although we do discuss it in induction and in first year undergraduate modules), and contain the takeaway message about the module and SFIA:

The structure for this module reflects a number of discussions with local employers and investors about employability. To be able to develop a concept to the point of being potentially commercial viable, and be able to communicate it effectively, involves considerable personal development. Scholarship skills are developed in the assessment of different approaches to innovation and in assessing competing trends in both the political and academic domains.

This module is the first module at Edinburgh Napier University to attempt to map the module's "learning outcomes" to relevant knowledge and understanding items contained in the skills framework for our industry (Skills Framework for the Information Age - see www.sfia.org.uk). Thus the 5-character references after each outcome refer to

- a 4-letter skill acronym (either Innovation (INOV, part of "Business/IT strategy and planning"), or Emerging Technology Monitoring

(EMRG) part of "Technical strategy and planning") and

- a level (6 = "Initiate, influence", 5 = "Ensure, advise").

Note that this does not mean that you will be able to get a job at this level after graduation. These reflect levels of autonomy, influence, complexity and business skills in these roles which would typically need a further 3-5 years practical experience in lesser roles after graduation, before you get the chance fully to apply your knowledge and understanding.

Module Structure

The module simulates a commercial innovation cycle. The teaching is front-end loaded to prepare students for working in groups to accomplish the main objectives of the module. At the end of the module students must reflect individually on the experience they display their Masters-level capabilities in the quality of this reflection.

The initial two teaching weeks of the module total 12 hours of active classes (4 lecture, 8 workshop) and are designed to supply the basic material for all five learning outcomes. The first week introduces the technology innovation landscape and the second week requires active participation in the classroom to make sense of these issues, which requires substantial background reading in advance.

A case study approach predominates, using recent collaborations with industry and projects to commercialise the School's intellectual assets. Students then use the understanding they have gained from these, and from directed reading, to create and self-evaluate an innovation for a digital market (a deliberately broad categorisation). The middle of the module involves an individual meeting with the module leader then weekly group meetings, with deliverables, to develop each student's concept.

In the group assessment, teams of students select one of their existing ideas (or a new idea) and develop it further with a view to applying for PoC funding – the Proof of Concept (Scottish Enterprise, 2012) funding mechanism (or equivalent). Formal classes resumed, intensively, in weeks 10-12 (12 hours of workshops and 4 hours of lectures). Students develop an understanding of how to research commercial viability and how to prepare an "elevator pitch". They design and practise project presentations to other groups and learn how to contribute and accept constructive criticisms.

Teaching Plan

| Wk | Lecture | Seminar/Workshop/Meeting | other work |
|---------------------|---|--|--|
| 2 6h | <i>Module Overview (1 hr) Case Study – thirty years of digital music (1 hr)</i> | <i>Innovation level 6 and Emerging Technology Monitoring 5 Discussion “Classic” capital-based innovation v User-centred innovation Open Innovation Critique iPod/iTunes</i> | <i>Review case studies and papers in advance of week 3 Review SE Proof of Concept website Review “People, Activities, Context, Technology” PACT (Benyon)</i> |
| 3 6h | <i>Intellectual Property – identification and protection(1hr) Case Study – Proof of Concept (1hr)</i> | <i>Applying PACT analysis to innovation (1hr) In small groups review a specific case study and present to the rest of the class (3hrs) Technology trends, social trends Type of Innovation</i> | <i>Review papers and websites on IP, patent searching, Freedom-to-Operate (FTO)</i> |
| 4 <1h | | <i>Individual meeting (5m) to agree cw1 topic</i> | <i>Carry out PACT analysis to understand needs. Carry out literature search on topic and prepare list for review</i> |
| 5 <1h | | <i>Individual meeting (5m) to review list of sources</i> | <i>Complete the literature review for cw1. Carry out FTO search, review market potential.</i> |
| 6 1h | | <i>Group meeting to review each other’s FTO and Market</i> | <i>Complete sections 1-3 of cw1. Commercial assessment: Sketch out planned approach and evaluation. Assess risks.</i> |
| 7 1h | | <i>Group meeting to discuss each other’s approach and evaluation plan</i> | <i>Complete cw 1 (submit via turnitin in wk 7 (noon, Wed 26th))</i> |
| 8 1h | | <i>Group meeting to discuss how to critique each other’s ideas</i> | <i>Review papers on peer evaluation</i> |
| 9 1h | | <i>Group Meeting to agree cw2 groups, topics and process</i> | <i>Meet in groups to plan and start the project.</i> |
| 10 4h | | <i>Financial modelling and making the business case (1hr) Skimming and drilling (1hr) In groups, refine core proposition then present to others (2hrs)</i> | <i>In groups identify how to quantify benefits, review existing market and FTO, and prepare a funding bid.</i> |
| 11 6h | <i>Case studies of recent commercialisation initiatives from Edinburgh Napier (2hr)</i> | <i>Scripting and choreographing presentations (1hr) Identifying skills within team, and skills gaps (1hr) Sustainability workshop (2hrs)</i> | <i>Further develop the group proposal Review proposal for sustainability – in terms of business, socio-economic and ecological sustainability</i> |
| 12 6h | <i>Case Study on branding and marketing (1hr) Skills planning (1hr)</i> | <i>Guest presenters (2hrs) Finalise presentations (2hrs)</i> | <i>Turn the proposal into a presentation</i> |
| 13 2h | <i>Make presentations (1h) Feedback and evaluation (1h)</i> | | <i>Write up individual reflections immediately</i> |
| 14 | | | <i>Complete reflective statement</i> |
| 15 | | | <i>Submit</i> |

Feedback for Learning

Our institution has a current campaign entitled "Feedback for Learning" (Edinburgh Napier University, 2010) which involves each lecturer identifying and communicating to students where, when and how they can expect feedback. In this case the following was advised. This level of feedback is intended to simulate that which might be gained “on the job”

Feedback is embedded at every stage of this module, both from the module leader but also from each other and external speakers. You should try to recognise where and when this

feedback is occurring. Some of it may not be welcome, initially. Some of it may even be wrong, and learning to critique other people’s critique of you, is also important.

Weeks 2-3 are intended to “level up” skills – both technical and people-related. Thus the intensive nature of the early classes is designed to encourage you to reflect on your existing understanding of innovation, and to debate in class and on WebCT to test your understanding.

The module leader holds a weekly “surgery” hour in C47 2-3pm Friday to let you clarify and reinforce your understanding of what you must

do for the courseworks. Coursework 1 will be marked and comments and marks supplied to you within the usual timeframe (this accounts for 50% of the module marks).

The group supervision sessions will explicitly provide formative feedback, as will the subsequent classroom sessions leading to the presentation coursework, which will incorporate both immediate verbal feedback and more traditional written summative feedback to cover 25% of the module marks - 15% for the group's achievement, and 10% for your personal contribution to the presentation.

The final paper (25% of the marks) is intended to be reflective - you supply your own formative feedback, with surgery hours providing additional formative feedback if you need it. The marks and summative feedback for the final paper will be in WebCT after the end of the semester, along with the final module mark that will be presented to the exam board.

Evaluation

This first instance involved only seven students, four from the MEng Software Engineering and three from the MSci Interactive Media Design. Two overseas postgraduate students attended for the first two weeks but then decided to choose a different option – they suggested that they lacked sufficient initial understanding of the digital marketplace. This suggests a need to define prerequisite learning, but it is important not to over-generalise from such a small cohort. Only one of the students completed the standard end-of-module feedback questionnaire, although these issues had also been discussed in a final class after the pitch to the external panel. The overall response was highly positive and the advice one student gave to future students was interesting:

Try and create a new idea, as my idea wasn't new or a good business plan, I did not take it further after the module. But with the support of the module, by the end of it, you have a lot of useful information if you decided to create a start up company.

Largely, the module met ambitions. The students did a very good job of each researching a digital market idea and writing a short paper (3000 words) on it for week 8. Thereafter they split into two groups, the teams each developed one of their number's ideas, until it was ready to pitch, in week 12, to an audience of six industrialists, entrepreneurial advisers and lecturers:

- An academic who had recently run a Scottish Enterprise Proof of Concept (PoC) commercialisation spin-out project.

- A professor with responsibility for co-ordinating faculty-wide research and commercialisation
- The director of the university's Moffat Centre, which advises students on how to start their own companies
- The CEO of a successful spin out company now in its second year of trading
- An entrepreneur, business "Angel" and senior advisor to government
- An entrepreneur and advisor for Scottish Enterprise PoC projects.

The panel rated each group's pitch in a number of dimensions. This was done only to provide additional feedback for learning to the students – the module leader awards actual assessment marks based upon achievement of the learning outcomes. Both pitches, though trenchantly criticised by the expert audience (in a way that the students reported afterwards as “brutal” and “a wake-up call”) were also well-received by that audience – no-one rated any aspect less than “adequate”, most were rated “good” and some were rated “very good”. Since the panel had been asked to judge these on a commercial basis, this alone was a remarkable achievement, and one which suggests that the use of SFIA statements was effective in leading to competency.

The module is designed to be intensive in weeks 2-3 and 9-12 (with double the usual amount of classes) and with only individual or group supervision contact in-between. In retrospect the students should have been encouraged into groups earlier and driven a little more in the early stages of the group phase. The feedback in the reflective statements suggests that they waited until week 10, when they got the marks for the first coursework before selecting their group's topic. Other issues noted included problems of attendance in the weeks where the timetabled classes changed pattern. Students appear to get into a rhythm with weekly classes, and need additional prompting when varying the pattern. Additionally attempts were only partly successful to ensure that students started work early on both solo and group assessments. These issues suggest that the students themselves are operating at a lower level of self-sufficiency as defined in SFIA.

The quality of the reflective statements was a little weak in terms of being “masters-quality”, and despite attempting to make clear, in the instrument of assessment, the need for citations, these were all but lacking. This was surprising as the referencing in the first coursework was, by and large, excellent. However there are some clear examples in the reflective statement of both reflective practice and a business orientation that suggests the module helps achieve the current

“graduate attributes” objectives. Here the SFIA statements did not ensure masters-level academic performance, although in the Board of Examiners meeting, the (experienced) external examiner singled out the achievements of the students in this module for commendation. This encouragement shows that while academics may face localised criticism for taking a competency-led approach, others taking a more holistic and objective view will see the merit.

Planned changes

This evaluation resulted in the following enhancement plan:

- Restructure the opening weeks’ lectures to ensure that the learners know that their assessments must explicitly reflect application of user-centred innovation theories.
- In week 3, agree slots for individual and group supervision meetings.
- Move the formation of groups earlier in the semester, and allocate the topic in week 7 to ensure that the groups get to work in week 8 on researching the idea they will pitch.
- Signal a week in advance, through all channels, that classes resume in week 10
- Ensure that the module survey happens in week 13

Implications for SFIA

This module has shown that it is possible and useful to build postgraduate teaching around SFIA competency statements. Both the university quality approval and quality enhancement processes proved to be no barrier, and the assessments produced clearly met expectations. The selection of level 5/6 for Masters-level, and 4/5 for Honours-level appear to be generalisable to other areas of computing, although basing a 20-credit module (nominally 200 hours of student work, including classes) on a single role level may be inadequate.

It’s important to note that much of this module, like most of our institution’s provision, is deeply embedded in practice (to the extent that the only real criticism of the student achievement was a lack of application of cited theory). As well as providing opportunities for students to gain knowledge and understanding well in advance of their first jobs in industry, university study **can** provide opportunities for developing practice competency to be ready for future opportunities.

3. CASE STUDY TWO: UXCF

IMD11108 is also part of a process to define both competency and courses to meet the demand for the relatively new skill of User Experience (UX). This UX Competency Framework process so far includes two events UXCF2010 (which brought forty industry and academic participants together to define levels of UX competency) and UXCF2011 (which progressed the design of academic courses).

UXCF2010, BCS Covent Garden, Feb 2010

This involved ten papers, half from industry, half from academia. Alternate sessions involved group discussions to identify how organisations and individuals developed competency in UX.



Figure 2: Some of the participants of UXCF2010, held 25th February 2010, BCS Covent Garden

As well as discussions, the groups created a number of affinity mappings or other diagrams intended to capture the skills needed in UX practice (see Figure 3 for an example). By the end of the day much of the discussion was about organisational maturity, both in terms of the UX companies and also their clients. This is consistent with other initiatives eg (Marcus, et al., 2009). In other work we plan to analyse this in more depth.



Figure 3: UXCF2010 - example skills mapping

In the first session, much of the dialogue centred on understanding to what extent definitions of job role or competency were shared across different organisations. For example:

"[D]o you employ a UX person as both a usability researcher and as a designer?"

"It’s more a prototype – they don’t have to deliver a perfect design (yeah) they can do wireframe."

Here, it's plain that there is a difference between those who research the usability needs of typical users (in SFIA terms, UNAN - User Experience Analysis) and those who create a finished web-site interface (SFIA has little on this – the closest is INCA – Information Content Authoring, or ADEV – Animation Development, while Skillset and CCSkills have some related definitions). Job demarcation needs closer study – the use of rough prototypes might indicate the need for an additional skill albeit at a lower level. The response to the second question adds a third SFIA skill – User Experience evaluation – UNAN, and shows how an individual's career path might progress from USEV2 to ADEV3 to (by participation in UXCF itself) UNAN4 or even HFIN5

"But you don't have a specialist research person and a specialist design person, you wouldn't want somebody combined?"

"(anonymised) does usability testing, I was hired as a usability tester and then was given the chance to do the design and turned out not to suck too badly at it to begin with and hopefully got a bit better

In a later discussion, the subgroup focused on range of skills, knowledge and understanding required.

Within this user research we identify two groups: a set of techniques which is about gathering requirements, understanding what's there; and another set of techniques which is about evaluating (...).

Then we talk about everything in the realm of prototyping, implementing, so we have server design, product design, web development, different techniques from wireframes – personas, scenarios. (...)

We realised we didn't get any techniques for innovation exploration so we start brainstorming about that and here we come up with ... Brainstorming (!), with body-storm, role play, workshop facilitating skills, mood boards – everything about ... right hemisphere.

In so doing they start to articulate the need to understand and optimise organisational structure (see Figure 4) and subsequently workflow within the organisation, to identify the learning needs for students and thus the design of the curriculum

We realised that these are a set of techniques that can be used to support the development of a set of skills. We also realised from discussions that, sadly, very few design companies actually cover the entire cycle of the design process. So, some people are primarily focused on user research, some people on prototyping, some people on conceptual development, so...

What was the idea in terms of learning? In terms of learning the students training (in) HCI and User Experience should be aware of the entire range of techniques from each of these domains. Ideally we'd also train them in which one is more appropriate to be chosen for the design process.

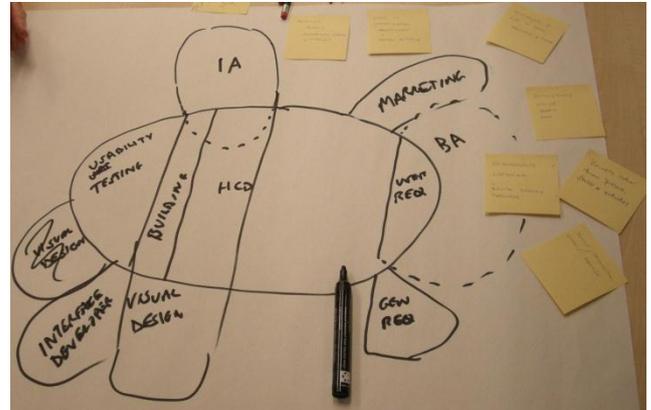


Figure 4: Example UX Organisational Mapping

UXCF2011

If UXCF2010 needed to involve as many stakeholders as possible, UXCF2011 was intended to be more focused and specific to the design of degree programmes. Existing modules were mapped against a table of professional competencies articulated the previous year, which helped identify gaps, and confirmed that IMD1108 would meet some of these gaps



Figure 5: Mapping academic modules to professional competency in UX

Figure 4 shows the mapping activity in action, with Figure 5 providing the finished table. The activities were each mapped against the levels of a Scottish degree. These equate to A-level, the three years of an English degree, and an English MSc, but the planned reform of the English Computing A-level will need to be quite radical to compare with the first year of a Scottish Computing degree, and the anomalies between the English and Scottish degrees complicate attempts to map qualifications to SFIA levels.

| Area | Components | SCQF 7 | SCQF8 | SCQF9 | SCQF 10 | SCQF 11 | gaps |
|-------------------------------|---|----------------|--------------------|-----------------------------|---------|--------------------------|--|
| Planning | Strategy, selection of alternatives, investigate and manage resources. Risk Management, Scope Management, Expectation Management, Decision-making | BD3 PD1,2 | CCD1-5 UCDW 2 | In generic modules only | | IUCD 2-3 UE2 DM1,2 | More risk mgmt needed, pragmatism, scope creep control. Case studies on persuasion/influencing |
| Research and Post-release | Formative, summative, identify needs, evaluate in use, Out of box experience. Context of use. Benchmarking. End of life/disposal | | PI1 UCDW 2 | CM1,3,4 ED1,3 | UX1 | UE1,3 IUCD 1,3,4 | |
| Requirements | Release criteria, acceptance criteria. User profiles/intended context. Scenarios, journeys, safety (operational requirements) contract (and specification?) | | CCD2,3 UCDW 1,2 | | UX4 | IUCD 1,4 | More effective agile approaches. Talking the user's language Articulating risks and trade-offs |
| Concept | Interaction design, modelling, design trade-offs. Feasibility, proof of concept LoFi prototypes | BD2, PD3 | PI1,3 | CM2,3 ED2,3 DS1,2,3,4 | UX3 | UE4 DM3 | The following items apply to both Concept and Content: Information Structure, Data quality, content strategy, influence behaviour. More conceptualisation and principled selection. Application of narrative and film theory |
| Content (or content strategy) | Information architecture, media mix, structure, provenance, data volumes, localisation. Configuration management and information structure | BD1 | PI2 | CM2, ED1 DS1,2,3,4 | | UE4 | |
| Design | Interaction design #2. User Interface modality. Error handling, HiFi prototype. Brand conformance, Wireframes, blueprints | BD1,3 PD4 | PI3 | ED2 | UX1 | UE3,4 IUCD 1,4 | |
| Development | Outsourcing. Verification, adaptability. Project standards, lifecycle issues | BD2,3 PD3,4 | | CM4 | | UE3 | (both seen as peripheral/boundary to UX) |
| Implementation | Rollout, beta versions, product localisation, customisation, user guidance, validation | | CCD5 | ED1 DS5 | | UE3 | |

Figure 6: Finished table of UX skills mapped against taught modules

The mapping is done against a typical set of specialist UX-relating modules in a computing degree, each written as an acronym adding a digit to represent the relevant learning outcome:

- BD Being Digital (SCQF7)
- PD Producing Digital (7)
- PI Playful Interaction (SCQF8)
- CCD Customer Centred Design (8)
- UCDW User-centred Design for Web (8)
- CM Collaborative Media (SCQF9)
- ED Experiential Design (9)
- DS Digital Storytelling (9)
- UX User Experience (SCQF10)
- UE Usability Engineering (SCQF11)
- IUCD Intro to User-Centred Design (11)
- DM Digital Markets (11)

Omitted from the list are more generalist modules which contribute towards BCS accreditation, such as "Introduction to Human Computer Interaction". While these contain UX content, they are also part of the compulsory curriculum for all computing degrees. The level 11 modules are unusual in that they assume no previous computing knowledge, but can also be taken by those with an undergraduate computing degree.

4. CONCLUSIONS

Curriculum Design in higher education in the UK has a great many influences, both in terms of what is to be learnt, and selection of both style and content of learning events. Lecturers themselves do not have autonomy in what or how they teach.

Each year brings new initiatives – some sectorial (for example, QAA’s Enhancement Themes), some institutional, as part of the creation and maintenance of their distinct identity, and some driven by input from learners themselves and employers, media, families and other stakeholders. Two current drivers in the UK are

- a widespread desire to see employability as involving more than just adding soft skills to discipline knowledge and understanding, but adding a third leg – commercial awareness/understanding or “nous(e)”
- to converge theory and understanding of practice with external benchmarks of competency or capability, such as those provided by SFIA, SFIPlus and others who define NOS

There is a further dynamic that seems neither to be widely understood nor even discussed. The first job roles that graduates get make little use of the skills, knowledge and understanding they gain in the later years of their degrees, but instead those from the start of their degrees or even at high school level. In the case of Computing, the skills are essentially those such as Java programming or database design. Graduates are expected to expert in a broad range of these basic skills, just at a time when they have long since moved on to higher order learning outcomes. Thus, in terms of SFIA, an honours graduate has often been studying (and practising) at level 4 or 5, but is likely to be employed at level 3 or even 2. This causes tension in two ways – graduates will commonly report on how mundane and uninspiring their first employers are, while employers report that students seem to lack the most basic skills.

Within my institution we have been exploring how we can create a greater sense of agency in students, to take responsibility for their own Personal and Professional Development. The university as a whole has courses and policies to deliver this, and within Computing, we have started to make them aware of the existence of SFIA, and to learn to differentiate between different roles, while at the same time appreciating the need to continue to polish the basic level skills long after these have stopping being assessable learning outcomes. More recently we have started to quality assure new modules (or subjects) and courses (or programmes) in terms of explicitly addressing professional practice. This has certainly streamlined the process of BCS Accreditation, and

we continue to investigate whether writing learning outcomes based on SFIA competency statements is feasible and desirable.

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