Chapter 3
Collaboration on Digital Media

Abstract The development of products and services in the area of digital media aims to meet current and future user needs and requirements. Such products and services are often dependent on the results of new research and development within the academy and other research and development organizations. Partnership arrangements between these organizations, industry, and appropriate Small and Medium Enterprises (SMEs) can assist in the development of such products and services, and the migration of such developments into wider society. An additional factor in the area of digital media is that there may often be interdisciplinary components to the research and development, and also the product or service that is developed. This is because of the nature of digital media, and the diversity of its constituent parts, and potential uses, such as electronic devices, sensors, software, firmware, digital images, digital audio, digital video, computer games, web pages, data, databases, social media, e-books, and Internet of Things. Digital media has a wide range of application areas and potential uses. Such users can come from a variety of backgrounds and cultures and therefore the products and services need to meet this diversity of requirements and ways of working. This in turn requires effective collaboration across traditional boundaries between disciplines.

Keywords Interdisciplinary research • Small and medium enterprises • Collaborative research and development • Team working • Small and medium enterprises

3.1 Introduction

> *Where do new ideas come from? The answer is simple: differences. While there are many theories of creativity, the only tenet they all share is that creativity comes from unlikely juxtapositions. The best way to maximize differences is to mix ages, cultures, and disciplines.* Nicholas Negroponte [1]

Collaboration in the field of the academy and industry collaboration, and in creative industries, is discussed in Chap. 4 in [2] Collaboration in the field of art and design is discussed in Chap. 3 in [3]. The benefits and challenges are summarized.

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Digital media has a wide range of possible components and potential uses. This in turn requires effective collaboration across traditional boundaries between disciplines. An initial discussion of this point is contained in Chap. 3 in [4]. This present chapter discusses the interdisciplinary challenges in more detail. In addition, the ready availability of tools and facilities for digital media provides exciting opportunities for the user as a creator and distributor of digital content.

3.2 Creative Collaboration

As noted in [3] a creative collaboration has the goal of generating a product or service. A team may be needed rather than a single individual because of the volume of work, the input required from different disciplines, or because the multifaceted nature of the task requires multiple skills.

According to Cox [5], it is necessary to consider some codes of behavior for successful teams to be able to work successfully –

1. *There must be a common, passionate goal for the team members*
2. *Members must have mutual respect for each other member and his/her discipline*
3. *Each member must be willing to learn from other members of the team*
4. *Each member must recognize other's intellectual territory*
5. *The team should not have too many members*
6. *The team must continually check to make sure that the research is making progress*
7. *Members must not become over-committed to other projects*
8. *One person must carry the flag for project as a champion and coordinate efforts*
9. *Each member must be credited and given his/her recognition when the project is presented or publicized*
10. *Each member must get something out of the project which is personally rewarding and tangible* [5]

3.3 Antidisciplinary Research

The MIT Media Laboratory is an antidisciplinary research laboratory working to invent the future [6]. Antidisciplinary implies beyond existing disciplines and a field of study with its own vocabulary, methods and strategies [7].

3.4 Advantages and Difficulties of Interdisciplinary Research and Development

Partnership and collaboration between researchers and industry can often facilitate the development of new products and services in the area of digital media. Such collaborations often cut across traditional disciplines, or require expertise from more than one discipline.

The advantages and difficulties of interdisciplinary research and development are now summarized.

3.4.1 Advantages

(i) Growth at the Boundaries of Existing Disciplines

New disciplines often grow at the boundaries of existing ones, e.g. genetic engineering (genetics/biotechnology), tribology (mechanical engineering/materials science), digital media (computer science/media/application domains), to name but a few. Such new areas offer researchers tremendous opportunities to advance the frontiers of knowledge for the benefit of society, industry, and the academy [8, 9, 10].

(ii) Potential for Knowledge Transfer to Industry and Society

New disciplines can present exciting opportunities for those involved at the ground level. There can also be significant potential in some areas for the generation of intellectual property that industry can translate into new and novel products and services that can be utilized by society. To continue the examples in the previous section, this could be illustrated by genetic engineering – with genetically modified crops – with greater resistance to disease; in tribology – with artificial joints; and in digital media – with social media. All these areas have made a significant impact on society with their products and services.

(iii) Freedom and Opportunity

New discipline areas appear to be flatter in their structures and organization and less subject to domination by hierarchies of senior faculty with strong views about what research should be done. Thus there can be more freedom, flexibility, and opportunity in new and emerging discipline areas. It provides time for the new discipline area to define a structure and organization most appropriate for moving it forward.

(iv) Publication

Generally there are more opportunities for publication of interdisciplinary research in conferences and journals because the work will done will often be both new and novel. The downside to this is that it will probably be difficult to get

acceptance in a world-leading journal (e.g. IEEE or ACM Transactions) as these cater for traditional discipline areas that have been well-established over a period of many years They are also very discipline specific, and with many paper submissions. This emphasizes the strategic importance of having a leading author of the paper who is highly regarded and working in a well-regarded center of excellence. Whether or not this is possible, it may still be necessary to begin publication in a journal of lower standing and work up to the higher levels if possible. The problem in this area is compounded in the UK because the periodic research audit exercise (REF) now only leads to funding for research (the QR component[Ref to book 1]) that is classed as world-leading (4*) and internationally excellent (3*). As 60% of this grading is determined by the quality of the published work submitted to the audit, there is clearly a significant drive to ensure that the publications of all faculty in the UK appear in the highest quality vehicles with clear international standing and reputation (and therefore known to be the most rigorous and selective in their international refereeing processes) in order to increase the possibility of a high grading in the REF review process. Thus there is now increased competition for publication in the highest quality international journals and conferences [11], even though the review process in the REF concentrates solely on the content within the paper and not its publication vehicle, nor its impact factor. However, the citation data for papers was made available to the REF reviewers. Clearly papers published in world-leading journals tend on average to be the most important papers in the field and therefore stand a greater chance of more citations, because more researchers will be looking at them [12].

(v) Lines of Reporting

Some new areas have been able to move their initiative out of the initial academic department or faculty (with its associated department head or chair to which reporting was made) into a university research center where the head of the new area reported directly to the provost or vice-president of the university. This resolves the potential issue of tensions within the department about the new area but brings substantial responsibilities for the new center to bring in substantial grant or sponsorship funding to support all its staff, researchers, equipment, and overheads. The new area is no longer able to rely on the overarching department to defray some of the infrastructure costs in its general budget. Generally such initiatives will not be approved unless the provost or vice-president is convinced by the business plan of the head of the new area that they will be able to generate revenue to fully support the work of the new center to enable it to operate independently. It will then be able to make its own collaborations with other academic areas or other institutions (and possible have funding to also support them) to further develop its work. An example of this is the Scientific Computing and Imaging Institute at the University of Utah [13, pp. 74–76]

3.4.2 Disadvantages

(i) Interdisciplinary Journals and Conferences

Interdisciplinary journals and conferences are relatively new, are not yet well-established, and therefore tend to have a relatively low impact factor, H-index, and citation levels of papers. These may become a significant aspect for the reputational value of the research reported and could affect promotion prospects, tenure prospects, and the general perception of the standing of the particular research area and its potential to attract future grant funding, and also good researchers to work in it. It can be difficult therefore to get published and establish a peer reviewed track record in a multidisciplinary area [14].

(ii) Applications to Grant Awarding Bodies and Agencies

Grant proposals are often reviewed by subject experts in the different disciplines contained in the proposal (often described as cross-referral), rather than interdisciplinary experts in the particular disciplines. This is because the procedures for selection and appointment of reviewers within grant awarding bodies is normally based upon performance and achievement within the existing disciplines – often to world or international standards, so the disciplines need to be well-established. This can lead to rejection if the subject expert ranks the subject component in the proposal as of less merit than that expected in a grant proposal that is solely within the subject area of the expert. In other words, the added value from one discipline to another may not be fully recognized or evaluated. In many interdisciplinary research proposals, the whole can be significantly greater than the sum of the parts. This may be very difficult to evaluate in an emerging area. In addition, evaluators may be unsure whether the proposers are leaders in their fields or not, and also whether the work is innovative or not.

(iii) Culture and Working Practices in Different Disciplines

Culture, vocabulary, and working practice differences in different disciplines may be initially difficult for junior researchers to accommodate in team working (and older researchers too!).

(iv) Relationship to Senior Faculty and the University

High achieving faculty in well-established disciplines can be overly dismissive of new emerging disciplines and may regard them as ‘applications’, ‘not academic’, and ‘lightweight’. It is recognized that such terms were sometimes used of computing when it emerged as a new discipline in the 1950s.

Chapter 2 has demonstrated that when computing technology was first developed it was not clear to many of those involved how far-reaching these developments would become, nor precisely what form these would take. This has also been repeated at key points during the subsequent development of computing technology. It has been hard to predict, but easy to be wise with the benefit of hindsight.

Similarly, it can take a significant amount of time to establish a new discipline in a university as it is in competition for resources with well-established disciplines and most of these tend to be very reluctant to see part of their own budget, or their space allocation, go to a new area. Indeed, there are still some areas within computer science that are still regarded in the same way that computer science was regarded as a whole. It can also generate tensions and misunderstandings between senior and junior faculty and their researchers. Senior faculty have generally progressed up the hierarchy in academia when the demarcation lines between different disciplines were very clearly defined. However, computing was fortunate. When the first computers were operational they rapidly became important national initiatives in many countries, and the universities received major grants from their national governments to establish their computing facilities, relatively primitive though they were at the time. These were immediately utilized by faculty and research students who could see the significant potential for their work (this latter point could also be regarded as a 'Pro' because such facilities opened up new avenues and new results that would otherwise not have been possible using the existing approaches in the traditional disciplines). Access to computing power constituted a major step change in the management, operation, and delivery of research results in many, if not all, disciplines. However, this did not stop some academic critics still referring to computer science as "merely applications of computing" with insufficient academic merit to be considered an academic discipline in its own right. Although this argument has essentially been won for computer science as a whole, the same argument is still being used within computer science by those that consider that their area is more meritorious than others. External observers of this have expressed the view that computer science has generally failed to learn the lesson that that the physical sciences have learned, viz, to present a united front to the outside world and not let vocal internal disagreements about priorities within the area devalue grant bids and requests to governments for budgets.

(v) Tenure Committee Considerations

New discipline areas can cause difficulties with tenure awarding committees in the academy because the application of traditional criteria may not be fully appropriate. There may also be additional concerns (whether real or not) about the long term viability of the new area, and therefore its ability to earn sufficient revenue to support a tenured faculty member. Such considerations rarely arise in the context of well-established disciplines because the amount they have earned over the years is fully documented and clear extrapolations can be made about the future. Thus involvement in interdisciplinary areas can affect the career advancement and tenure decisions for faculty who research in these particular areas [15].

(vi) Employment of Faculty on Part-Time or Zero-Hours Contracts

Many universities are limiting their financial commitments by employing faculty on part-time or zero hours contracts. In the UK, when the use of typical academic staff is factored in, 54% of all academic staff and 49% of all academic teaching staff are on insecure contracts [UCU data]. This means that these faculty are in working

conditions that leave them poorly paid, vulnerable, and constantly facing the prospect of unemployment [16].

In the USA, 76% of academics are in casual nonpermanent posts (with 70% of these being part-time), according to the American Federation of Teachers (AFT), the largest Higher Education union. Many teach at a number of institutions to generate income – and have to travel between these institutions at their own expense. The AFT calculates that the median pay per course per semester for such staff is around $2700, meaning that an experienced professional teaching three courses a semester might earn only $24,300 a year [17].

The implications of this trend is that the number of advertised tenure track positions is relatively low, so the chances of a tenured career in academia are slim, and are likely to be available to only the very highest performers in traditional disciplines. New disciplines are likely to be an even lower priority for tenured posts. The key primary driver is now economic, not developing new disciplines.

3.5 Conclusions

Effective collaboration has the power to add significant value to digital media research and development and the products and services that are the outcomes. Such collaboration is not without its challenges and difficulties, particularly in the area of enabling collaboration across the boundaries and ways of working associated with traditional disciplines. However, a changing world requires changing ways of working in order to be effective.

Further Reading

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