Interdisciplinarity: Models and Values for Digital Humanism

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Abstract This chapter starts from the recognition that the world is facing major challenges and that these may be best addressed by people working together, across different disciplinary domains and between universities, civil society, governments, and industry. After sketching these problems, I provide an overview of the meanings of discipline and of multi-, inter-, and transdisciplinarity. I then provide a brief historical overview of how disciplines emerge. Examples from computer sciences, social sciences, and the humanities, and collaborations between them, are used to illustrate these definitions and overview. In the final part, I reflect on what this means for digital humanism, drawing on different models and values of collaboration.

The 2030 Agenda for Sustainable Development, prepared by the United Nations (UN) and approved by all countries in 2015, identifies 17 goals, crucial for the future of the planet. These include ending poverty, empowering women and girls, reducing inequality, and taking action to combat climate change (UN 2015). Interestingly, digital technologies are not explicitly mentioned in any of the goals, although they could be seen as both part of the problem given, for example, their enormous energy needs and the emergence of new forms of digital inequality. They could also be part of the solution by making it easier to share data and knowledge to solve problems such as those arising from an ageing population and by expanding access to education.

The problems underlying these goals could be characterized as "wicked problems," those political and intellectual challenges that defy easy definition or solution. No single academic discipline can provide an adequate definition of such problems much less a clear and feasible resolution. The UN calls for partnership and collaboration to tackle these goals. To do so will require multi-, inter-, and transdisciplinary research. The UN is not alone in making such calls. Many research-funding agencies and policy-making organizations emphasize the importance of engaging

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with different disciplines and stakeholders in order to tackle contemporary social and scientific problems.

In this short chapter, I first discuss the meaning of discipline and of multi-, inter-, and transdisciplinarity. I then provide a brief historical overview of how disciplines emerge and conclude with different models and values of collaboration and what these could mean for digital humanism.

Multi-, inter-, and transdisciplinarity are sometimes used interchangeably, but they each capture something different, described in the following paragraphs. But first it is necessary to understand what an academic discipline is. Disciplines have their own cultures and practices and provide those trained in them with skills, tools, methods, concepts, and ways of thinking. They come with their own notions of how the world is organized and of what constitutes good quality research (Knorr Cetina 1999). Disciplines are usually institutionalized, in university departments and faculties, in professional associations, and in specialized conferences and journals. Reproduction of disciplines from one generation to the next is typically done via formal, accredited education and sometimes involves shared competence criteria (Hackett et al. 2017). An example of the latter is the "Computing Competencies for Undergraduate Data Science Curricula" (ACM 2021). It is less usual to find such criteria in the humanities and the social sciences, although those disciplines often have implicit norms and expectations of the knowledge and competences students should possess by the end of their degree programs.

Having provided a working definition of discipline, let us now move to the ways they may be combined. These are usually presented in a hierarchical form, with multidisciplinarity being the least integrated. Multidisciplinarity can be described as moving between disciplines in order to understand a topic or problem from different perspectives. This can lead to greater knowledge and may be very helpful in making policy or other decisions, but there is little integration of methods or concepts from the contributing disciplines. For example, economic modelling can be used to understand the incidence of poverty in a country, but pedagogical studies provide the basis for policies to tackle educational inequalities between children from different socioeconomic backgrounds.

Interdisciplinary education and research deliberately attempt to combine and synthesize methodologies and specialized jargon from different disciplines in order to produce a more comprehensive solution to a problem or to address a complex topic. For example, this occurs when computer scientists and linguists work together to understand changing language patterns in large text corpora.

Transdisciplinarity goes outside the university in order to incorporate knowledge from other non-academic sources and stakeholders. There are many possible stakeholders with specialized knowledge and experiences that can be valuable in the production of knowledge. In the case of healthcare, this could include patient organizations, the pharmaceutical industry, and nursing professional associations or unions as well as biomedical researchers, sociologists of health, medical ethicists, and data scientists. There are many terms in circulation for transdisciplinary knowledge production, including post-normal science (Funtowicz and Ravetz 1993), the triple helix (Leydesdorff and Etzkowitz 1998), and Mode 2 (Nowotny et al. 2001).

Having briefly defined the key terms, let us return to academic disciplines. They can have the appearance of immutability, rather like an immutable object in some kinds of computer programming, something that cannot be changed after it has been created. Nonetheless, it is important to remember that academic disciplines can and do change. Many academic disciplines now taken for granted, such as mathematics, history, and philosophy, have very long histories, just as universities do. Others, including engineering and social sciences, emerged in the late nineteenth century, largely in response to the challenges posed by industrialization and urbanization in Europe and the United States. The rise of industrialization and engineering was in no small part the impetus behind the establishment of technical universities in many countries. Even though change might be slow, new disciplines can and do emerge, and the focus and emphasis in long-standing disciplines may change.

The expansion of the university system after World War II in industrialized countries was one catalyst for change. Growth was accompanied by an increase in the diversity of students, staff, and (inter)disciplines. In the final third of the twentieth century, the emergence of a new field was sometimes related to the diffusion of a new object, such as the internet in the case of new media studies. In other cases, the availability of new techniques and instruments could lead to a new field, as in computer science. In yet other cases, such as women's studies, the emergence could be attributed to the greater diversity of people entering universities, people who may identify new problems and ways of working (Wyatt et al. 2013). Such new fields may find their first institutional homes in literature, electrical engineering, or sociology. As they grow and stabilize, they can become institutionalized in the ways mentioned above, by developing their own departments, educational programs, journals, and professional associations.

Not all attempts at creating new disciplines are successful. Some might be very strong in research and the creation of new knowledge, published and shared in specialized journals and conferences, but this is not always accompanied by widespread or strong educational profiles. For example, neuroeconomics—the study of how economic behavior affects understanding of the brain and how neuroscience might guide economic models—might be taught only in a relatively small number of universities at advanced level. Nonetheless it has its own specialized jargon, with conference and publication outlets, for sharing ideas and developments.

Inter- and transdisciplinary collaborations have, as mentioned above, been heralded by national and international organizations looking for innovative solutions to complex and wicked problems. But collaborations are not always easy to achieve. Not all disciplines are equal, neither in terms of available funding nor in terms of epistemic and social legitimacy and status. Such inequalities can hinder productive collaboration, and thus the remainder of this text focuses on different modes of collaboration across disciplines.

In particular, I reflect on what this might mean for "digital humanism." that "community of scholars, policy makers, and industrial players who are focused on

ensuring that technology development remain centred on human interests."[1] According to the definitions sketched above, this is clearly a transdisciplinary endeavor, retaining the problem-solving aspirations of engineers and computer scientists, but doing so in a way that supports human interests and well-being. These are, in part, captured by the UN's Sustainable Development Goals mentioned earlier. They could also be articulated in terms of fundamental values of democracy, equality, freedom, and solidarity.

Just as there are different ways of doing disciplinary research (and it must be remembered that disciplines are not homogenous in their methods and theories), there are different ways of doing inter-, multi-, and transdisciplinarity. Barry et al. (2008) distinguish between three modes of interdisciplinarity: service-subordination, integration-synthesis, and agonistic-antagonistic. In the service-subordination mode, one discipline contributes to another without changing the rules of the discipline to which it is contributing. For example, computational methods and tools could be taken up within linguistics without any fundamental change to linguistic theory. Or, a historian could explain the boundary changes between cities or regions or the development of occupational categories that make the merging of historical census data more difficult.

The integration-synthesis mode refers to a more symmetrical relationship between the contributing disciplines through a genuine integration of methods and concepts, as in the case of neuroeconomics mentioned above, and in countless other examples. For example, in order to understand how researchers find data for potential re-use, Gregory (2021) draws on both information science and science and technology studies (STS) to develop a richer understanding of the diversity of users and their data practices.

In the third antagonistic mode, those from one discipline might aim to alter another in fundamental ways. This has sometimes been claimed in efforts to bring computational ways of thinking to the humanities, for example. At its worst, this can be seen as insulting, by suggesting that computational notions of rigor and reliability are superior to the quality standards of the humanities. But antagonism does not have to be negative. Academic research, in all disciplines, is characterized by debate and by careful scrutiny of knowledge claims and of the evidence on which they are made. It is to be expected that digital humanism will be characterized by sometimes heated debates between computer scientists wishing to solve what they define as technical problems and those in the humanities and social sciences who might find this excessively narrow and will point out how entangled the social and technical always are. In other words, the social scientist or humanities scholar might argue that digital technologies are always a material intervention in society and cannot be understood independently from social, cultural, economic, and political contexts. This can be productive as it can lead to reconfiguring the "boundaries, objects, and problematics" of the antecedent disciplines (Barry et al. 2008, p. 30).

[1] https://dighum.ec.tuwien.ac.at/

These different modes of interdisciplinarity are intended as heuristic. They are not exhaustive of modes of collaboration and nor are they mutually exclusive. From my own experiences of interdisciplinary collaboration, I have identified one resource and two values: time, respect and humility. There are many guidelines regarding collaboration, but there is no fast or simple route to success. Just as disciplinary training takes time, so too does learning to collaborate. Each project or group needs time to develop shared vocabularies, methods, and ways of working. People also need to respect other disciplinary ways of working even if they do not necessarily understand them. We all need to recognize that the disciplines in which we have been trained may not have all the answers nor even always the right questions. This is another way of phrasing the old adage that "if your only tool is a hammer, then everything looks like a nail."

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