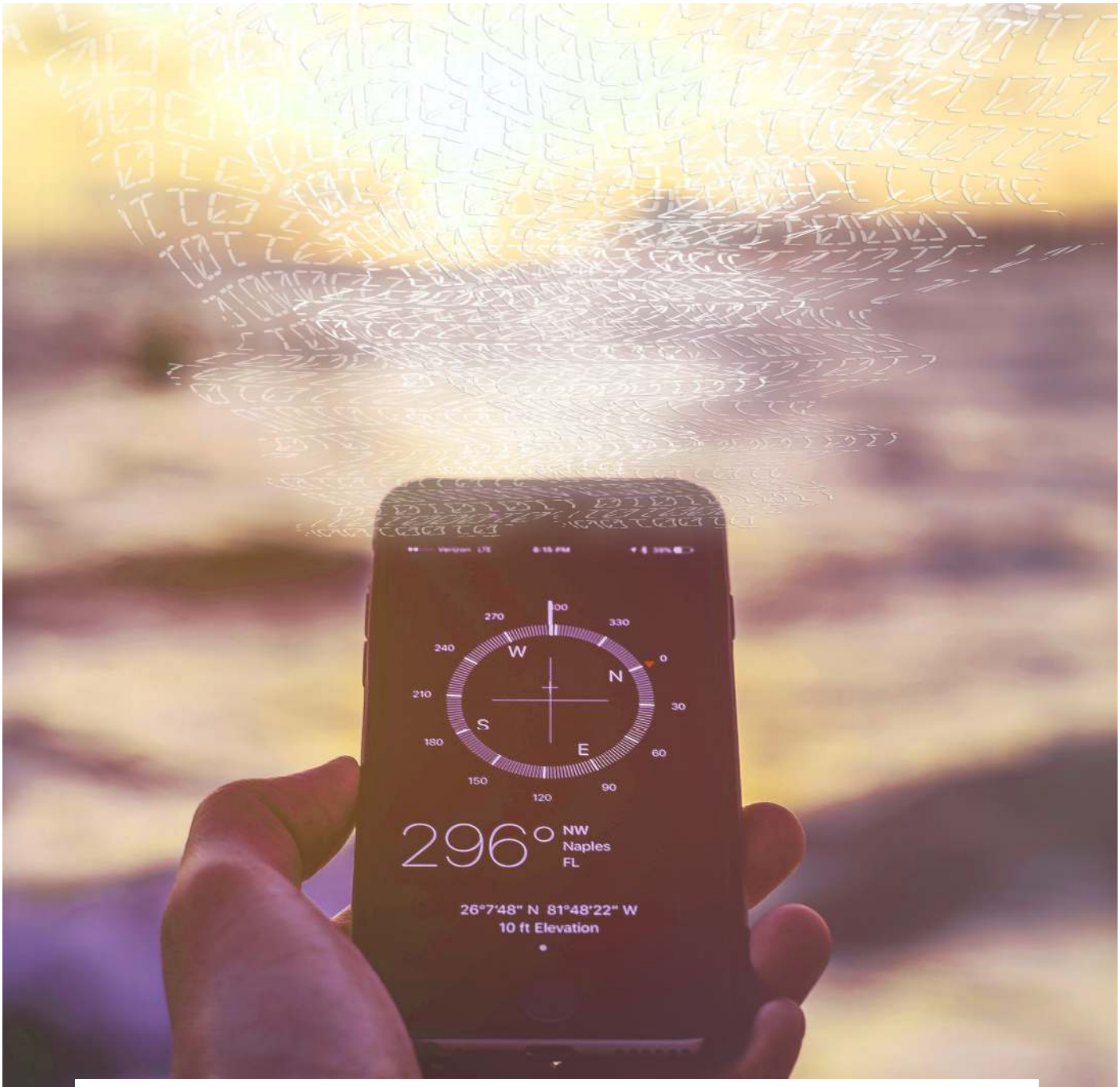


# Developing a Professional Ethics for Algorithmists

## Learning from the Examples of Established Ethics

- Working Paper -

BertelsmannStiftung

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# Contents

# 1 Preface

Under the catchphrase “social credit system,” the Chinese government introduced in 2015 plans that could have been the product of a dystopian series on Netflix. The plans involve providing each Chinese citizen a score denoting their trustworthiness by the year 2020. Everything from online activity to shopping and traffic behavior to assessments by educators or supervisors at work will be captured as data and transformed via algorithmic systems into a numerical value. China’s leadership has expressed its commitment to rewarding trustworthiness and penalizing dishonesty. The future looks increasingly bleak for those with poor scores: booking flights, traveling on high-speed trains, having a loan approved, sending your child to a good school or getting a job or apartment could prove difficult for those deemed “not qualified.”

This example shows quite clearly that people are crucial in determining whether or not an algorithm does harm or good to society. An algorithm is nothing more than rules of action for a computer system – in essence, a complex step-by-step set of instructions. The morality of the machine is thus always already based on human decisions and actions. Despite their potential for harm, we can nonetheless see, as sociologist Steffen Mau has said, “that algorithms are subject to practically no justifications [...]. Protocols for algorithms and coders remain hidden backstage – we see only a world of curves, asterisks and bars – and take this at face value” (Mau 2017: 206–207).

One means of addressing this problem is to formulate a set of ethical standards for the design of algorithms. This idea is not entirely new. In Germany, for example, the ethical principles published by the Gesellschaft für Informatik were adopted in 1994, revised first in 2003 and most recently in June 2018. There are also several highly topical proposals developed elsewhere that outline criteria for ethical activity among algorithmists and data scientists. In our latest discussion paper addressing the issue of an algorithm ethic “Quality Criteria for Algorithmic Processes. Analyzing the Strengths and Weaknesses of Selected Compendia,” Noëlle Rohde compares the three most widely known codices. In its “Ethically Aligned Design” publication, the Institute of Electrical and Electronics Engineers (IEEE) calls for transparency in algorithmic systems and for a consideration of ethical values in programming. The Future of Life Institute and the Fairness, Accountability and Transparency in Machine Learning (FAT/ML) organization identify freedom, data privacy, responsibility, explainability, auditability and transparency as such values (Rohde 2018).

Despite their socially relevant and desirable recommendations, these documents face a similar challenge: none of them are binding and are therefore little more than empty claims. Furthermore, we lack a dedicated ombuds agency to which individuals and organizations can turn to and file complaints regarding failures to meet the standards of an ethical code.

Although the field of algorithm design has yet to develop professional ethics with effective impact, there are plenty of positive examples found in other professions. The Hippocratic Oath for physicians or the Press Code for journalists stand out as good examples. The report presented here focuses on the lessons learned from the example of these and other professional ethics.

Professor Dr. Alexander Filipović, Christopher Koska and Dr. Claudia Paganini have selected six professions – medicine, social work, journalism, public relations, advertising and engineering – to examine the issue of bindingness in professional ethics. What criteria does such an ethics need to fulfill in order to prove effective? How can we ensure that the criteria are met with acceptance and become binding? In other words: What are the factors contributing to the success of other ethics and which of these factors are transferable to activities associated with algorithmic decision-making processes? The authors identify ten success factors that are to be considered in establishing effective professional ethics for algorithmists.

We publish the analysis presented here in order to contribute constructively to a rapidly developing field and thereby foster further developments. We would like to thank the authors for their inspiring contribution and with them look forward to receiving comments and suggested improvements or other constructive criticism from our readers. To foster discussion, we are publishing this study under a Creative Commons license (CC BY-SA 3.0 DE).

This paper is published by the “Ethics of Algorithm” project at the Bertelsmann Stiftung, which explores the impact of algorithmic decision-making systems on society. The Ethics of Algorithms project has also published a series of discussion papers, including a collection of international case studies (Lischka and Klingel 2017), an examination of the potential impact of algorithmic decision-making on social inclusion (Vieth and Wagner 2017), an analysis of the impact of algorithmic processes on societal discourse (Lischka and Stöcker 2017), a working paper on sources of failure in algorithmic decision-making processes (Zweig 2018), and an analysis of the General Data Protection Regulation (Dreyer and Schulz 2018). In addition to the aforementioned comparison of international codices (Rohde 2018), other recent publications include a survey of what Germans know about and think of algorithms (“Was Deutschland über Algorithmen weiß und denkt” Fischer and Petersen 2018, in German only) and a survey of strategies to ensure algorithmic processes serve society (Krüger and Lischka 2018).

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# 2 Introduction

Good algorithm developers are in high demand. But what distinguishes a good creator of algorithms? In 2004, Google posted giant billboards with the following text in the San Francisco Bay Area and in Cambridge, Massachusetts, with the aim of attracting potential new employees (Figure 1).

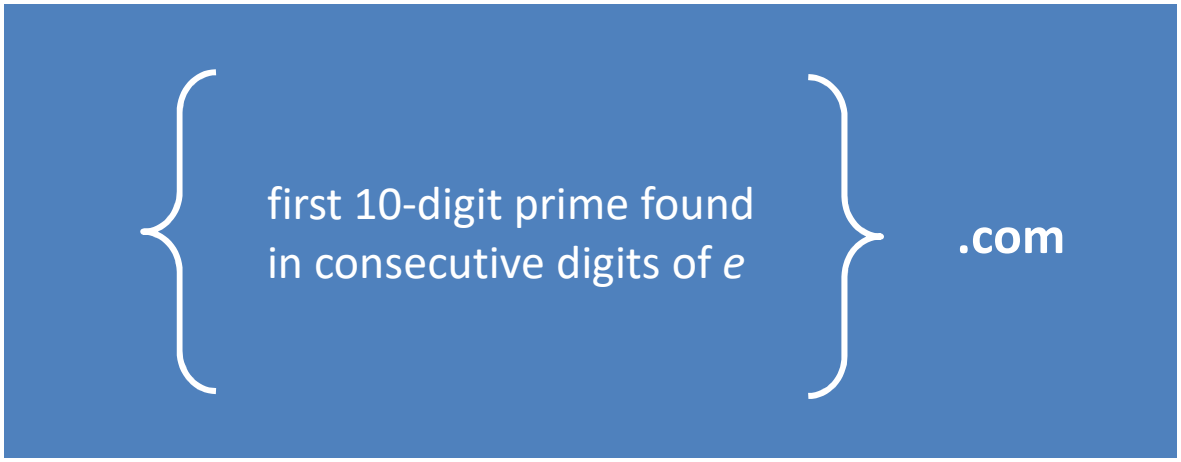


*Figure 1: Google poster (Source: Own illustration* on the basis of Wennborg 2017)

Because the billboard made no reference to the company and provided no other information, this procedure served as an initial filter enabling Google to speak solely to those able to understand the algorithmic task. Only those who took the trouble to program an algorithm identifying the first 10-digit prime-number sequence following the decimal point in the Euler number e were able to reach the website http://7427466391.com, where another, still more demanding task awaited them. And only those who successfully solved both tasks were then invited by Google to submit a job application – regardless of whether they had completed a particular information-technology training program or certain course of study.

The company's strategy is just one of many examples showing that algorithm development is far from a closed professional field, and that it is indeed a highly dynamic area. However, this dynamism is reflected not only in the constantly changing tasks faced by those who create algorithms, but also in the field's still-nascent professional ethos. People in this professional field are increasingly beginning to feel a sense of their own responsibility, as recently demonstrated by the efforts of Brad Smith, Harry Shum and Oren Etzion to draft a Hippocratic Oath for artificial intelligence (AI) developers (Etzioni 2018). Contributions such as these show that a good algorithm developer is not only someone who can decode an encrypted job advertisement, but someone whose actions are also guided by certain ethical standards.

The emergence of a professional ethics is a process that can occur either slowly, over the course of generations and centuries, or very quickly, within years or a few decades. The latter case in particular offers considerable opportunity to set the process moving in a particular direction from the beginning, through the conscious emphasis of a specific concept. However, the risk of being led into dead ends as a result of time pressure is also greater. Thus, it makes sense to provide academic philosophical accompaniment and support as this code of ethics for algorithmic work develops. In this initial period, the authors of this study also take a systematic look at the phenomenon of professional ethics more generally, and in so doing point to paths that algorithm developers could usefully take as they strive to develop their own field's ethos.

Our initial focus (Chapter 3) is on selecting various professional ethics whose developmental history and overall relevance are likely to provide useful insights for the ethics of algorithms. We then examine these

professional ethics more closely in our central section (Chapter 4). In this analysis, our primary focus will be on identifying which factors determine the success of each professional ethics. Characterizing and delimiting the professional field of “algorithm design” will constitute a second primary task (Chapter 5). In addition to providing a historical overview, the focus here will particularly be on how this activity is typically embedded in a company context.

Chapter 6 (“Conclusions”) combines these two strands – the analysis of various professional ethics and the effort to place an ethics of algorithms in its proper context. Based on the results of the detailed analysis, we derive 10 general criteria for a successful code of professional ethics. We then consider how these criteria could be applied to an ethics of algorithms – that is, in a summary of the study, we ask how a professional ethics for algorithmists should be created on the basis of the identified criteria. We begin with some prefatory methodological remarks (Chapter 2).

# 3 Prefatory methodological remarks

On the following pages, we will present examples of successful professional ethics, and will delineate their success factors. In the course of this task, we will also identify examples of less-successful professional ethics, along with causes for their failure. Furthermore, we will provide substantive grounding for the study's research focus on the fields of medicine, social work, journalism, public relations (PR) and marketing, advertising and engineering, and indicate the degree to which each activity area can be related to algorithmic processes.

Methodologically speaking, this raises the initial question of how the success or failure of a professional ethics can be measured, or the degree to which such a code is accessible to academic analysis. Professional ethics – to begin with the last point – are established and passed down in a variety of ways. In addition to the applicable codes of self-regulation, there is obviously a plethora of position papers, official statements and guidelines. Even oral and lived traditions may come into play, for instance when a chief physician explains the basis for his actions to a new senior staff member, or when a press spokesperson, in the course of general daily business, helps an intern understand what moral boundaries should be respected when engaging in the daily practice of interest-guided communication. These kinds of unwritten traditions are difficult to capture within academic analyses; moreover, given the large quantity of documents that have been written and archived, it appears necessary to make a targeted selection. Otherwise, the mass of documents requiring analysis would exceed the scope of this report. In addition, one goal is to ensure a reasonable degree of comparability between the various professional ethics examined; this will be possible only if we consider documents that are similar with regard to type, function and institutional anchoring.

To this end, it appears most useful to focus our efforts on self-regulatory codes that have achieved the highest degree of bindingness within a profession. Yet how can this bindingness be measured, and how can it even be quantified? Readers expecting hard criteria providing unambiguous information may be disappointed. Such criteria could most likely be defined for legal guidelines that have been adopted and broadly recognized, or whose observance is monitored with sanctions applied in cases of violation. However, the field of professional ethics is primarily composed of self-regulatory codes, recommendations (prescriptions) and suggestions (proposals) – thus, various textual genres, each of which carries its own specificities and eludes the clear evaluation that might be possible in the case of a legal text. Sanctions are not always possible, and when they are imposed, implementation is usually dependent on voluntary compliance by the party being reprimanded.

In addition, the idea of "bindingness" is itself ambiguous, being composed of at least two elements: the quality of being widely recognized, and the quality of being effective. Any general statement regarding a professional ethics' bindingness would therefore also contain two parts: first, indicating how broadly it is generally recognized, and second, establishing the degree to which the representatives of a professional group are prepared to realize this ethos or let it guide their daily actions. This intention in turn will have a particular relation – itself requiring examination – to actual behavior, or to the way in which individual decisions subsequently affect interactions with all participating persons. In other words, an ethical code's effectiveness is the outcome of a complex, dynamic process, which makes working with hard criteria all the more difficult.

However, soft criteria can also be employed in this context. In a certain sense, such criteria are signs that can be interpreted with reference to success or failure, and indeed must be interpreted. Such signs, if they exist, can be found in a professional association's official decisions, or in the observation that some such judgments are communicated by the actors concerned, meaning they have an effect on practice, while others do not. The fact that many codes of self-regulation themselves address the issue of bindingness, and thus offer additional material to the interpreter, is also interesting. An additional soft

criterion addresses the issues of whether a professional ethics constitutes an element of the relevant course of study, whether it is broadly familiar to members of that profession, and whether it plays any role in their daily lives.

These latter considerations could clearly be investigated through the use of empirical surveys. However, for the purpose of this report, we can consider such questions only if surveys addressing these issues already exist. In the course of analyzing the various professional ethics, we will make repeated reference to this kind of soft criteria of bindingness. Moreover, we will offer evaluations that involve quite different criteria, depending on the material available for each professional field.

But back now to the codes of self-regulation. The fact that these can vary quite substantially at times, both in terms of scope, quantity and substantive precision, can be explained by the fact that the necessity for more or less detailed self-regulatory codes relates in turn to the degree to which the field is regulated by national law – that is, whether state regulation, a legislatively enshrined self-regulation or a voluntary self-regulation is practiced. In addition, the degree to which the profession is exposed to public criticism also plays a role – that is, whether the profession's reputation is regarded as more or less at risk. While these differences do not diminish the fundamental comparability, they are closely correlated with the success or failure of a professional ethics and will be incorporated into the analysis in this respect. However, in some areas, there is either a great number of self-regulatory codes (a selection problem) or virtually none, or those that do exist play no significant role in the profession's self-conception. In such cases, we must look to other sources.

Overall, the focus is on relatively recent documents that can be clearly classified, whether developed and signed by sectoral interest groups, professional associations or companies. With regard to older documents, it may be the case that a single self-regulatory statement is valid for multiple areas or has gained significance beyond its original purview. For example, the *Code de Bordeaux,* concluded in 1954 by the *Fédération Internationale des Journalistes* and intended primarily for journalists, has since become a significant document within the public-relations sector as well.

Potential source materials include international documents holding significance across Europe or worldwide, as well as national-level documents, such as the various codes of professional ethics from the German-speaking countries of Germany, Austria and Switzerland. From this generous selection of codes, we have primarily used documents holding significance within Germany. We will reference international documents or conditions in Austria or Switzerland only where this can contribute to a substantive deepening of our analysis.

This analysis of the relevant codes and comparable sources is essentially divided into two parts. First, we will describe the process of creation for each. In doing so, we will identify the reasons for its existence, as well as the process by which it has been updated over time. In addition, we will cover the question of the code's primary audience, as well as issues of form and accessibility. This will entail a look at the degree of institutionalization, complaint procedures and sanction options, along with thoughts regarding the degree to which the code is familiar to and followed by the profession's practitioners, and whether the relevant document(s) in fact form an element of the profession's self-conception and external perception.

# 4 On the selection of analyzed professional ethics

There are as many professional ethics as there are professions. Not all are suitable for an analysis, for instance because the professional ethos is unwritten, and thus difficult to collect for research purposes. The question is which of these professional ethics will further the goal of this study – to draw lessons from successful examples that may be useful in producing an analogous ethics within the field of algorithm design. This decision is essentially based on two criteria: the success of a professional ethics, and its thematic fit, in the sense of having significance for the subject of our investigation.

## 4.1 Success

In the context of this report, one essential criterion for the consideration of a professional ethics is its success or lack of success. However, this perception of success or failure is closely linked to the issue of bindingness, given that professional ethics are usually intended to have practical effect. As we have previously seen, this bindingness cannot be established without additional information; rather, it calls for a context-sensitive interpretation, as we intend to provide on the following pages. Over the course of this analysis, we will discuss a variety of aspects that appear to be significant in relation to the success of a professional ethics. Thus, the professional codes presented will be those that have "proved" themselves – though perhaps more from one perspective than from another. Before going into detail, we will provide an overview of these relevant factors.

### Social background

The degree of homogeneity within the group for which the professional ethics was or is being developed is among the initial factors crucial for success. The clearer the boundaries delimiting this group from the outer world, and the stronger the feeling of internal solidarity, the easier it is for members of this group to agree on common values and principles. Identification with the group also increases individuals' feelings of responsibility to the collective, thus providing additional motivation to actually implement the rules adopted as part of a self-regulatory policy. The difficulty in developing a common ethos when the group is not homogenous, and when members have only loose – if any – ties to one another, with hardly any sense of mutual solidarity and loyalty, can be seen in the example of user ethics.

What was probably the first document for self-regulation on the part of users can be dated to the year 1995, when the Internet Society (ISOC) released its request for comments numbered 1855. Later, as *RFC 1855*, this in a sense became the original source for the "netiquette" concept. Nevertheless, no generally recognized user ethics has to date been able to establish itself on a broad basis. This is true of the various proposals for a general netiquette, as well as of the more specific proposals, for example within the blogger or hacker communities, that have emerged with varying degrees of overlap. A further difficulty is evident here: specifically, that the group faces no outside pressure to cultivate a good image. Consequently, its members show little interest in protecting the community's reputation.

### Material context

Strongly conflicting interests within the group also make it difficult to successfully establish a professional ethics code, with the financial factor playing an important role. If sufficient resources are available to facilitate reflection on what binds the group together – for instance, what traditions or roots have an appreciable background influence – it becomes easier to develop common concerns and values. If a collective has the financial resources to create a professionalized framework for this process, this is usually reflected in the substantive quality of the self-regulatory document. This in turn has a crucial

influence on whether associations can work constructively with these texts, or whether individual actors regard them as useful tools for application to daily practical challenges.

Certainly, between the capital invested and the substantive quality, there exists – as we have seen – a further criterion for success. While this is not a necessary correlation, the opportunity to have self-regulatory documents prepared by academics or experts plainly has a positive effect on the documents' clarity and sharpness. To take just one example, despite all the good will and engagement in the world, it is of course much harder for a small animal shelter in Upper Bavaria to develop a coherent code of ethics for its employees and volunteer assistants than it would be for a financially strong and nationally active public-relations association.

## Institutional background

As a next step in measuring success or the lack of it, we look at implementation and institutionalization. Which associations decide to adopt an ethics codex as binding? How is this decision made public? How are its contents communicated? This point shows once again why user ethics have such difficulty in winning acceptance. In this case, it is because texts are so-called user-generated content – that is, contributions that are made or updated over the course of the process, and thus are not typically collected in a "canonical" version. Indeed, it is often difficult to identify a clear point in time at which this submission process is finished. To be sure, the idealism of the early days is still quite evident here with regard to avoiding a definition of knowledge as the possession of any individual; however, for the awareness and acceptance of a common ethos, this is a clear disadvantage.

So-called de-professionalization trends must also be considered in this context. This means that the success of a professional ethics faces particular difficulties if the profession itself begins to "dissolve," with people who are poorly trained or untrained pushing into the field of activity. This phenomenon has been seen in journalism, for example, where bloggers have begun to disseminate journalistic content without sufficient reflection on their own actions, in large part due to a lack of training. Efforts such as Rebecca Blood's "Weblog Ethics" (2002) can offer a counterweight; however, due to the lack of institutionalization, such efforts cannot produce a "new" professional ethics.

Success thus manifests at a variety of levels. Development is rarely ideal at all of these levels simultaneously, making it difficult to draw final conclusions. It is still more difficult, as well as riskier, to render a judgment regarding the failure of a professional ethics. This is in part because failure is not typically seen as a low point from which an improvement or new beginning can and should follow. Rather, it is regarded as a definitive characteristic, generally associated with a negative moral judgment. Because of this, we prefer not to speak of "failed" professional ethics in the following text. However, we do intend to show why some have become better established, while others have by contrast been unable to realize an ideal development, and therefore cannot be considered as models for a still-to-be-developed ethical code for the field of algorithm design. Thus, we have selected professional ethics that have proved sufficiently "successful." By engaging with them, we can expect some benefit for our work with the ethics of algorithms. Where this is less likely, as in the case of the above-mentioned user ethics, we will not engage in a thorough examination. However, we can derive insights that will be useful for our subsequent compilation of important success criteria even from these dysfunctions.

## 4.2 Significance for the subject of investigation

A second criterion for the selection of professional ethics to be analyzed here is their substantive significance for this report's subject of investigation. Inasmuch as this report is guided primarily by formal criteria for the success of a professional ethics, substantive aspects in fact play only a small role. For instance, we have decided from the outset not to analyze professional ethics that fall specifically within the thematic field of algorithm design. The goal is rather to derive insights for and enable transpositions to this thematic field. For example, one question is whether it would be useful to examine sources specifically from the computer-sciences profession. On substantive grounds, an analysis of such sources would without question be relevant to a professional ethics for the algorithm-design field. By contrast, from a formal perspective, it is not clear at the outset that these ethics would generate vital lessons; nor does this conclusion in fact impose itself on us in this report. As this study has the above-described goal of deriving insight, we have thus decided against the analysis of computer-science ethics. Nonetheless, in order to analyze a professional ethics with some thematic proximity, we do examine the engineering field, which in fact has some overlap with computer science. This decision also gives us the opportunity to start afresh as we derive our conclusions for the field of algorithm design, rather than retracing the (too narrow?) paths already taken by existing computer-science professional ethics.

Our selection of professional ethics to be analyzed is thus grounded primarily by formal considerations, supplemented by some substantive factors. On this basis, we have made the following selection:

The *professional ethos for the medical field* will be used, as it is one of the oldest form of professional ethics formulated explicitly as such. It has been progressively developed over the course of generations, and with the ethical principles recently composed by Tom Beauchamp and James Childress (2009), has even served as the basis for a full-fledged normative approach to moral philosophy. Particularly in the post-war period, the medical field's ethics served as a vital source of inspiration for many nascent professional ethics. The medical field's ethos ultimately derives its particular significance from the strong potential to do harm on the part of the professional groups involved. This may also be an interesting standpoint for the field of algorithm design.

The *field of social work* is important because here, as in the case of an algorithm-design ethics, we are dealing with a non-homogenous collectivity drawn from a number of different professional groups. Thus, it may be possible to discover interesting parallels. In addition, professional activity in the social-work field is very invasive, in the sense that it intervenes deeply in people's lives. Social-work professionals are quite aware of this fact, which is clearly expressed in their field's ethics. This may enable interesting conclusions for the field of algorithm design.

The *journalists' ethos* can also look back on a long tradition and has influenced other professions' ethics. Together with the professional ethics established in the public-relations, marketing and advertising fields, it is a key defining element within the sphere of media communications. Because this area involves information, knowledge, gatekeeping and communication streams, it is thematically close to the field of algorithm design.

Within the *public-relations and advertising field,* the relevant codes of ethics seek to grapple with the realities of economic conditions, always with the aim of reconciling social responsibility and economic goals. This aspect too may be interesting for the field of algorithm design.

Finally, we have selected the *field of engineering.* Here, we can primarily expect insights regarding interactions with technology, and with respect to the question of technology's neutrality. There are also substantive points of reference here, particularly with regard to the challenge of formulating a code of ethics in a positive way, and thus avoiding perceptions that it is a barrier to progress.

# 5 Criteria for successful professional ethics: Analysis of emulation-worthy professional fields

## 5.1 Medicine

### 5.1.1 Background and developmental history

Allusions to the medical field's professional ethics typically involve reference to doctors in their function as healers. This means we are dealing with a professional group that necessarily shoulders a particularly large burden of social responsibility. This fact helps explain the early need for the creation of a professional ethics, as expressed by the fourth century B.C.'s Hippocratic Oath or the Declaration of Geneva Physician's Pledge, whose original version, adopted by the World Medical Association's (World Medical Association, WMA) General Assembly in 1948, is regularly updated. The profession can thus look back on a long tradition that provides a solid foundation for meeting today's continually shifting challenges, and which has additionally served as inspiration for numerous other professional ethics in their early stages of development. Beginning in the early modern period, a growing number of universities and colleges began to borrow excerpts from the Hippocratic Oath to use in doctoral-degree conferment oaths and other graduation ceremonies for medical groups such as nurses, midwives, pharmacists and so on. This ultimately helped spur the formulation of independent self-regulatory codes within these sub-fields.

In addition to these medical-profession groups, however, the doctor's role as researcher also offers occasion for moral-philosophical reflection. In exercising this function, doctors are simultaneously mandated to promote the health of their patients and contribute to scientific progress; for this reason, the WMA deemed it necessary in 1964 to create a supplement to the Declaration of Geneva in the form of the Declaration of Helsinki. This self-regulatory document, which places the interests of human research subjects clearly above the goal of obtaining new knowledge,[1] is also frequently updated, and provides the basis for ethics-commission decisions around the world. Indeed, the fact that any medical study using human subjects must be reviewed by an ethics commission ensures that the document's provisions remain binding.

Focusing instead on the role of the doctor as healer, it is immediately striking that in Germany, candidates for medical licensure do not take either the Hippocratic Oath or the Declaration of Geneva Physician's Pledge. However, doctors do commit to observing their individual federal-state professional codes, which typically follow the (Model) Professional Code published by the German Medical Association. This professional code, which is directed at all physicians[2] regardless of their type of employment or whether they are currently practicing, contains the currently valid version of the Declaration of Geneva Physician's Pledge just before its preamble. The (Model) Professional Code itself does not constitute binding law; however, each of the local state professional codes do.

### 5.1.2 Bindingness

The professional codes of the individual chambers of physicians thus apply to all doctors licensed in a given federal state, as well as doctors who reside in that state. Violations are handled using so-called professional-law procedures, which are regulated by the chamber law. This can lead to a variety of

[1] WMA Declaration of Helsinki, General Principles, Article 8: "While the primary purpose of medical research is to generate new knowledge, this goal can never take precedence over the rights and interests of individual research subjects."

[2] Geneva Declaration Physician's Pledge (: "As a member of the medical profession I solemnly pledge:")

sanctions depending on the degree of severity and the available evidence, including warnings, reprimands, fines of up to €50,000, withdrawal of active and passive chamber voting rights, and – as the most severe measure – the determination that the accused is unworthy to exercise his or her profession. Since mandatory membership in the chamber of physicians ensures that practitioners are bound by the professional code, the physician's professional ethics in Germany exhibits a very high degree of bindingness. However, the Hippocratic Oath and the Declaration of Geneva's Physician's Pledge feature more prominently in the public's perception, as they embody what is commonly understood as the medical ethos. By contrast, the professional code and the commentaries published by individual chambers on current issues of ethical interest are likely to be less well-known among the general population

The medical field's professional ethics thus exhibits a high degree of practical efficacy. However, as we have seen, one additional feature requires mention. When American medical ethicists Tom L. Beauchamp and James Childress published their 1979 work "Principles of Biomedical Ethics" (Beauchamp und Childress 2009), they helped initiate a development that to our knowledge remains unique. The "principlism" to which this work gave birth is today regarded by professional ethicists not only as a contribution to the progressive development of a professional ethic, but also as a new normative approach that today is discussed on the same level as meta-ethics, normative ethics and applied ethics. Indeed, this kind of professional ethics is no longer understood by the academic community solely as the application of general moral principles, but rather as an independent praxis-derived contribution that today exerts its own influence on the process of developing abstract norms. This is a strong indication, from an entirely different perspective, of a very high degree of efficacy. Although no studies on this topic are available, we have seen in our work on medical-ethics commissions and in our teaching at medical universities that the overwhelming majority of practicing doctors and even medical students several semesters into their studies are familiar with Beauchamp and Childress' four principles. To a certain extent, this is likely to be a byproduct of the developments outlined here.

Similarly interesting in this regard has been the rise of the ethics-of-care, a generally feminist approach stemming from Carol Gilligan's original 1993 concept. This theoretical framework found its way into the medical-ethics discourse relatively quickly and has there evolved into a quite robust independent approach. A change in direction has to a certain extent taken place here too, insofar as the current ethics-of-care discourse is clearly dominated by issues of medical ethics. However, at least within the German-speaking countries, it is not widely known outside the field of moral philosophy, probably because this rather soft approach is difficult to reconcile with the clarity of the Kantian tradition. Recently, particularly in the nursing sector, an increasing number of attempts have been made to more strongly spell out an ethics-of-care perspective that focuses on compassion for the needs of nursing personnel, patients and relatives. It remains to be seen whether this detour through normative ethics will succeed in bringing the medical field's various interacting groups more closely together. However, the fact that a professional ethics has roots in the scholarly discourse certainly helps increase its weight within the public debate.

### 5.1.3 At a glance – Physicians' Professional Code

Developmental process

- *Reasons for existence*
  - German Medical Association, objective: effective self-regulation
- *Updates*
  - Regular updates to the Model Professional Code (most recently in 2015; Geneva Declaration Physician's Pledge updated in 2017); the code is also adapted to specific conditions within individual federal states
- *Audience*
  - Physicians
- *Form and accessibility*
  - Model Professional Code, available at www.bundesaerztekammer.de/recht/berufsrecht/muster-berufsordnung-aerzte/muster-berufsordnung (see Bundesärztekammer 2015)

Institutionalization

- *Complaint options*
  - Professional-law proceedings following a breach of professional duties
- *Sanctions*
  - Various levels depending on severity (warnings, reprimands, fines of up to €50,000, withdrawal of active and passive chamber voting rights, determination that the accused is unworthy to exercise his or her profession

Awareness and recognition

- *Self-conception*
  - Sufficient; is an aspect of licensure
- *External perception*
  - Public is aware of a professional ethics (Hippocratic Oath), Hippocratic Oath serves as a model for other professional ethics

## 5.2 Social work

### 5.2.1 Background and developmental history

Activity as a social worker is often preceded by an (embryonic) socio-ethical consciousness. Many people are also driven by this attitude to volunteer or pursue part-time social work. Adopting social work as a career, and professionalizing this practice, involves graduation from a relevant training program or university that systematizes the specialist knowledge needed to practice the profession. However, the spectrum of related activity is so broad that social work is often used as a collective category encompassing very different professional areas and fields of practice that cannot be clearly distinguished from activities pursued by competing professions.

As a result, social work is often denied recognition as an independent discipline or profession, even if an objective analysis of the facts tends to argue otherwise (see Staub-Bernasconi 2011: 267). In this environment, the decades-long existence of ethical codes for social work is thus of particular significance, as these can be considered an important step toward the profession's autonomy. For example, the German Professional Association for Social Work's (DBSH) current goals include defining the field of activity and creating a professional law (including a professional register) to bolster the DBSH code's regulation of key interactions and relations of responsibility.

Ethical codes within the social-work field appear primarily in three different contexts. First, there is an international level that constitutes a federation of national organizations, and which provides an overarching reference framework with values oriented toward human rights and social justice (in coordination with the United Nations). This task is exercised by the International Federation of Social Workers (IFSW; for an overview of the more than 100 national member associations from Asia, Africa, Europe, Latin America and North America, see the organization's website (IFSW n.d)). Some member associations have also developed their own national-level codes of ethics in addition to the IFSW's general international code (see IFSW 2012). This group currently includes organizations from Australia, Canada, Denmark, Finland, France, Germany (DBSH), Ireland, Israel, Italy, Japan, Luxembourg, Norway, Puerto Rico, Portugal, Russia, Singapore, South Korea, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

At the second level, individual nations develop their own ethical standards, as with the emergence of the social or welfare state during the Weimar Republic; alternatively, a (regular) internalization of existing guidelines may take place within the state's social policy.

The third level encompasses institutions that offer professional social services, and which generally have their own codes of ethics. This includes hospitals, nursing homes, neighborhood assistance facilities, faith-based institutions, and so on.

### 5.2.2 Bindingness

Ethics codes at the uppermost level lack hard legal regulatory mechanisms. Approval and observance of the code is here typically defined as a key condition of membership in the relevant organization. The same is true at the third level; in this case, employees usually commit to following the ethical codes' provisions by signing an employment contract. Enforcement of the code then depends on the association's internal rules or is up to the employer. By contrast, ethical guidelines that have been incorporated into national social legislation (second level) give affected parties the right to make claims via the respective public authorities, and vice versa.

The example of social work makes it particularly clear how (social) ethics is given super- and subordinate status relative to (social) legislation. Apart from some core general standards and principles (such as human rights), no institution is assigned exclusive competence for the interpretation of certain societal values. For example, today's liberal societies are no longer accepting of extremely paternalistic social

states. Therefore, ethics codes not only supplement social legislation, they also lead to regular reassessment and revision so as to reflect social change. Because one key task of such codes is to bring practitioners into dialogue with one another, and because many social workers have a strong consciousness of values, the codes themselves are also living, regularly updated documents. For example, new challenges such as digitization demand that certain requirements be further specified in order to secure and – where possible and useful – even improve existing performance standards (such as protection of the private sphere).

"Professional policy is also social policy," says the German Professional Association for Social Work's website (DBSH n.d.a). The DBSH has also proposed the creation of a European-level chamber structure for social work. A professional code with validity throughout Europe would naturally boost bindingness, at least with regard to aspects of the relevant code, to a new level. However, the DBSH deems this vision "unlikely to be realized" (DBSH n.d.b). Thus, we must for now wait and see whether, and to what degree, the creation of a professional law (including a professional register) for social work within Germany indeed renders the field's codes of professional conduct more binding.[3]

### 5.2.3 At a glance – DBSH Professional Code of Ethics

Developmental process

- *Reasons for existence*
  - German Professional Association for Social Work 1997 – 2014, objective: professionalization of social-work as an occupation
- *Updates*
  - In coordination with, and making reference to, the IFSW international code of ethics
- *Audience*
  - Social workers (youth-support and social service workers, teachers for special-needs populations, child-care providers, and so on)
- *Form and accessibility*
  - Self-regulatory code, published in the association's magazine "Forum Sozial – Die berufliche Soziale Arbeit," available online at https://www.dbsh.de/fileadmin/downloads/DBSH-Berufsethik-2015-02-08.pdf (see DBSH 2014)

Institutionalization

- *Complaint options*
  - The DBSH has created its own Professional Chamber for Social Work (BKSA) to implement its professional ethics. This consists of three active bodies: 1) an ethics commission, 2) an ombuds office and 3) a two-chamber system that includes an (i) advisory chamber and an (ii) appeals chamber (complaints body), whose rules of procedure are explained in the body's professional code.

[3] Note: A study by Frank Como-Zipfel, Iris Kohlfürst and Dieter Kulk with the working title "Die Rezeption berufsethischer Standards, Kodizes und Richtlinien in der Praxis der Sozialen Arbeit" (The Reception of Professional-Ethics Standards, Codes and Guidlines in Social-Work Praxis) is scheduled for publication in the fall/winter of 2018. This promises to provide further insights relevant to this professional field.

- *Sanctions*
  - Under the association's jurisdiction

Awareness and recognition

- *Self-conception*
  - High level of identification among practitioners, and very active use of the ombuds office
- *External perception*
  - The association's magazine, "Forum Sozial," is published four times per year; in addition, information on the guidelines is regularly provided to universities and interested groups.

## 5.3 Journalism

### 5.3.1 Background and developmental history

Journalism features the longest tradition of independent professional ethical statements. Indeed, the early observations on journalistic ethics by Otto Groth (1875–1965) and Emil Dovifat (1890–1969), each of which referred to an individualist ethic in their work, can be regarded as the birth of media ethics as an independent philosophical discipline. Thus, it is of little surprise that the internationally applied Code de Bordeaux, published by the Fédération Internationale des Journalistes (IFI), appeared as early as 1954. Updated in 1986 with a new ninth article inserted between articles six and seven, the IFJ Declaration of Principles on the Conduct of Journalists (as it is known in English) has been instrumental in shaping numerous national-level self-regulatory statements. This includes Austria's Code of Ethics (Ehrenkodex) for the Austrian press, Switzerland's Declaration of the Duties and Rights of the Journalist (Erklärung der Pflichten und Rechte der Journalistinnen und Journalisten), which today has been expanded to include supplementary guidelines, and Germany's Press Code (Pressekodex; also known as the Journalistic Principles of the German Press Council). The ORF Code of Conduct (Verhaltenskodex des ORF; Austria) and the SRG SSR Programming Charter (Programmcharta der SRG SSR; Switzerland) can also be seen as documents of journalistic self-regulation.

Germany's Press Code, which was heavily inspired by the IFJ Declaration of Principles, was originally developed in 1973. In its current updated form, completed in March 2017, it includes a preamble, 16 sections with thematically associated guidelines, and a concluding chapter on complaint procedures. The importance attributed to this ethics code over the last 45 years remains undiminished, even though the Netzwerk Recherche journalists' association published a deliberately succinct Media Code (Medienkodex) as a first supplement to the Press Code in 2006. Like the Media Code, the Code of Ethics published by the German Association of Trade Journalists (DFJV) is not conceived as an alternative to the Press Code, but rather as an expansion. This latter document focuses particularly on the conduct of individual journalists, independently of their publication, employer or publishing house. Available on the German Press Council's website (www.presserat.de/pressekodex, see Presserat 2017), the Press Code is by contrast directed toward "every person active in the press" (Press Code, Section 1); this means that every German journalist is responsible for regulating his or her conduct along the guidelines specified in these Journalistic Principles.

Founded in 1956, the German Press Council adopted these principles based on its self-conception as an entity mandated to stand up for the freedoms of the press, including the right to information and the expression of opinion in Germany; tasked with upholding the importance of the press as a fourth estate monitoring politics with watchful eyes; and ultimately able to establish an effective mechanism of self-

control as an alternative to state control. The Press Code is recognized by the group's member associations, and its normative guidelines are regularly discussed, revised and updated by the Press Council. Complaints submitted to the Press Council are reviewed and can result in sanctions in the form of public reprimand.

### 5.3.2 Bindingness

The fact that this public reprimand constitutes the only sanction mechanism has led and continues to lead some to criticize the Press Council as being ineffective. However, with only a few individual exceptions, the media organizations subject to criticism over the years have actually printed these reprimands. This means that the Press Council's rulings as well as the Press Code's guidelines are being taken quite seriously. The significance of this professional ethics is also evident in the fact that debate over the Press Code's normative standards is active and ongoing, for instance in relation to Guideline 12.1.[4]

The fact that editorial professionals feel compelled to make arguments for and against a certain guideline indicates that they are certainly not indifferent to the mandates contained in the Press Code. The strong emotions that have at times characterized the debate also suggest that the Press Code plays an important role in the journalism field's self-conception. The practice of publishing reprimands also means that there is an adequate degree of external perception. The fact that this single journalism-ethics document has been well established for 45 years further bolsters its recognition and acceptance.

Another sign of its success is the previously noted fact that in the years of its existence, the Press Code has inspired and served as template for numerous self-regulatory statements in other professions, including the areas of public relations, advertising, user ethics, and more. Similarly positive is the fact that neither Netwerk Recherche's Media Code nor DFJV's Code of Ethics have sought to revise the original; rather they acknowledge it as binding, and have positioned themselves as updates. Finally, it is also worth noting that the Press Code has its own Wikipedia entry, which is rather unusual for a self-regulatory code, and represents an additional indication of its broad recognition and degree of acceptance.

### 5.3.3 At a glance – Press Code

Developmental process

- *Reasons for existence*
  - German Press Council 1973, objective: effective self-control as alternative to state control
- *Updates*
  - Regularly, most recently March 2017
- *Audience*
  - Journalists
- *Form and accessibility*
  - Self-regulatory code, available at http://www.presserat.de/pressekodex (see Presserat 2017)

[4] *Press Code*, Guideline 12.1: "When reporting crimes, care must be taken to ensure that mention of the suspects' or perpetrators' ethnic, religious or other minority membership does not lead to discriminatory generalization of individual misconduct. As a rule, such membership should not be mentioned unless there is a well-founded public interest. In particular, it must be borne in mind that such references could stir up prejudices against minorities.

Institutionalization

- *Complaint options*
  - Press Council
- *Sanctions*
  - Reprimands

Awareness and recognition

- *Self-conception*
  - Is a part of the journalism profession's self-conception
- *External perception*
  - Sufficient, is used as a model for other professional ethics

## 5.4 Public relations

### 5.4.1 Background and developmental history

In the field of public relations, there are a variety of documents regarding professional commitments in both national and international contexts. It therefore comes as no surprise that the *German Public Relations Council* (DRPR) lists – not one – but ten binding ethics codes for the profession, six of which are international and four national. In addition to the international codices Code d'Ethiques (or Code d'Athènes), Code de Lisbonne, Code of Venice, ICCO Stockholm Charta, PRSA Member Code of Ethics and the U.S. Code for Financial Public Relations, it lists four German professional codes, the Communication Code (Kommunikationskodex), the Seven Commitments (Sieben Selbstverpflichtungen), the de'ge'pol-Verhaltenskodex, and the Pleon Code of Conduct. It also identifies the SEAP Code of Conduct, the GA Code of Ethics, the Code of Brussels, the IPRA Verhaltenskodex (international), the DPRG-Grundsätz and the GPRA-Grundsätze (Germany) as well as the Ehrenkodex des PRVA and the Ethik in der Digitalen Kommunikation (Austria). There is a dense network of intertextual references within these documents, some of which implicitly – others explicitly – identify other codes.

Taking the two oldest documents as a basis, namely the Code of Venice, which was adopted by the International Public Relations Association (IPRA) in May 1961, and the Code d'Ethiques, adopted by the Confédération Européenne des Relations Publiques (CERP) at their General Meeting in Athens on 11 May 1965, the various professional and interest groups have each compiled their own self-regulatory documents, which have been published on their respective websites and affirmed as the basis for their own activities. With regard to the German Public Relations Council, the body of case law is based on the DRPR guidelines as well as the aforementioned documents, which are more or less along the same lines in terms of content and above all endeavor to meet the special obligations of interest-driven communication – namely discretion and loyalty to the client. Thanks to the considerable similarity of content, the coexistence of these different documents, each claiming their own validity but without clearly defined hierarchical relationship to one another is, in case of complaint, largely unproblematic. However, this situation neither helps the professional group to communicate a clear message to the outside world nor assists stakeholders in identifying with one or other of the codes.

This is likely to have led to the DRPR's adoption of the "German Communications Code" in 2012, in a process that was supported by media experts and in cooperation with its umbrella organizations (BdP[5], DPRG, German Association of Political Consultants[6]). This code, as the introduction makes clear, maintains the tradition of the documents from Athens, Lisbon, the GA Code of Ethics and the Seven Commitments of the DPRG, and is intended to bring a measure of standardization. Although it has not been updated since it was first published, it should bear in mind that the Communication Code – which is addressed to "PR and communication professionals"[7] is itself an update of a written tradition that dates back to at least 1961.

### 5.4.2 Bindingness

The (at least intended) special role of the Communication Code is supported by the fact that it is not only available via the website of the German Council for Public Relations (DPRG) but also via a specially created site, which was host to a discussion on the draft document in the run-up to its adoption in 2012 (DRPR 2012). The ability to leave comments may have been an attempt to increase acceptance within the profession as well as to improve the standing of the document to outsiders and will certainly have helped in this regard. However, despite the prompt and detailed explications of the authors, participation is likely to have been on the modest side.

An active effort to increase the bindingness of this set of professional ethics is also appreciable in the characteristic style of the code. Following a basic strategic positioning, the principal part of the document examines the target values of transparency, integrity, fairness, veracity, loyalty and professionalism, whereby the latter target value is directly correlated with self-regulation. Firstly, and in particular, it is stressed that, due to the "free" nature of access to the profession of PR, it is particularly important to safeguard one's own qualifications through training and to self-critically question whether one is mastering "the instruments and methods of the field of occupation."[8] Business integrity (Article 14) is mentioned in the same breath as professional expertise, and Article 15 explicitly states that "knowledge and compliance with the codices and guidelines are [...] part of professional qualifications."[9] As such, the conclusive section of the code serves as a revaluation of the entire document. An adequate level of moral judgment and action is therefore not an additional and desirable qualification, but rather a core competency that PR experts must develop in order to be worthy of their titles.

It is hard to say whether these efforts could help to increase the awareness and acceptance of professional ethics. Interestingly enough, over the years, and despite its numerous self-regulatory documents (as well as the manifest effort to publicize these accordingly), the PR industry has not really succeeded in bringing about a perception of itself as an occupational group with a strong professional ethos. This may be due to the fact there is a general assumption that the field of PR has no actual interest in good moral practice but is merely interested in a better image or has given in to social pressure and, as a consequence, is pursuing the path of self-regulation. In the year 2000, a study of the professional field by communication scientist Ulrike Röttger came to a correspondingly sobering conclusion: From a total of 374 interviewed DPRG members, 70% were unaware of the DPRG's Seven Commitments and 52% did not know the Code de Lisbonne, while 22% said they had heard of the Code d'Athènes (Röttger 2000: 20).

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[5] Bundesverband deutscher Pressesprecher.
[6] Deutsche Gesellschaft für Politikberatung.
[7] Deutscher Kommunikationskodex, general section.
[8] Deutscher Kommunikationskodex, Article 14.
[9] Deutscher Kommunikationskodex, Article 15.

In 2014, that is, two years after the publication of the Communication Code and the concomitant public-relations activities, as well as efforts to anchor self-regulation more strongly in the respective qualifications, a similar study (Dillmann 2014) came to far more encouraging outcome: Some 61% responded they knew the Code de Lisbonne, 93% were aware of the DPRG's Seven Commitments, and 16% of the freshly introduced Code of Communication, although these refer only to the names of the documents and not their content. This may not count as a satisfactory outcome, and as neither survey was particularly comprehensive, they can only be considered to be limitedly representative. Nonetheless, it is possible to formulate a cautiously optimistic conclusion: as long as representatives of professional ethics do not tire of building awareness of their codes, they are facilitating a wholly positive development. Hence, success in matters of professional ethics is, among others, a question of ongoing commitment.

### 5.4.3 At a glance – Communication Code

Developmental process

- *Reasons for existence*
  - *German Public Relations Council* 2012, objective: bundling similar documentation, standardization
- *Updates*
  - No new version, however the Communication Code (Kommunikationskodex) is to be viewed as an update of various codices (since 1961)
- *Audience*
  - PR and communication experts
- *Form and accessibility*
  - Self-regulatory code, available at Kommunikationskodex (DRPR 2012)

Institutionalization

- *Complaint options*
  - German Public Relations Council
- *Sanctions*
  - Reprimands

Awareness and recognition

- *Self-conception*
  - Growing awareness and recognition in recent years
- *External perception*
  - No data available

## 5.5 Advertising

### 5.5.1 Background and developmental history

A different situation is apparent in the field of advertising, where at both international and national levels, only a few self-regulatory documents exist, although these are the more extensive and precise. With the exception of the Code of Ethics from the European Association of Communications Agencies (EACA), which, like the professional codes for journalism and PR, consists essentially of abstract principles and vaguely worded imperatives, they clearly define how a good ethical practice for advertising professionals can and/or should look like, down to the very last detail. For example, the second authoritative international document, the Consolidated Code from the International Chamber of Commerce (ICC), spans more than 50 pages and sets a clear, almost casuistic framework, encompassing practices such as the monitoring of conversations and the depiction of scientific research, to name just two.

Although the national codes in Germany, Austria and Switzerland see themselves as supplements to this instrument, some nevertheless pay even greater attention to intricacies, such as the set of principles laid out by the Commission on Integrity in Commercial Communication (Switzerland), which regulates, among others, the minimum content of gold, silver or platinum that permits the use of the term “precious metal.”[10] While the Austrian Advertising Industry Ethics Code is structurally very similar to the ICC Code and the Swiss principles, Germany has something of a special situation. This is because the German Advertising Council does not work with a single code, but with a set of ten documents that were authorized and published between 1974 and 2017, and have each been used to address challenges relevant to their respective period. While the retention of some older instruments may allow for a number of interesting observations on the historical development of the advertising industry, certain examples, such as those from the 1974 “Bulletin on Tire Advertising,” seem somewhat antiquated.

Nevertheless, in the case of substantively highly relevant text, as in the preceding set of principles, for example, there is an updated version – in this case from 2007. The Code of Conduct of the German Advertising Standards Council against personal denigration and discrimination are available in the 2014 version, the Code of Conduct of the German Advertising Standards Council on advertising with and for children and adolescents in the version from 2017 and the Code of Conduct on Commercial Communication for Gambling in the 2012 version. All of these codes are directed at advertising professionals, who are addressed in the preamble – insofar as one exists – as “members of the Central Association of the German Advertising Industry (ZAW).”[11] Together with the international codes for the advertising industry, the documents published on the site of the German Advertising Standards Council serve as a basis for decision-making in the event of a complaint. Unless a referral to the corresponding bodies of related professional groups (or in the case of violations of the law, to the government agencies specialized in this matter) would appear to make sense, the German Advertising Standards Council is tasked with examining any substantiated complaint. Typically, it will then request a response from the concerned company and/or request a change or a halt to the advertising. If this does not occur, the only remaining possibility of imposing a penalty is a public censure.

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[10] Grundsätze – Lauterkeit in der kommerziellen Kommunikation, Grundsatz Nr. 5.8 (Swiss Lauterbarkeitskommission 2008: 24 f.).

[11] Verhaltensregeln über die kommerzielle Kommunikation für alkoholhaltige Getränke, Foreword; Verhaltensregeln über die kommerzielle Kommunikation für Glücksspiele, Preamble (Deutscher Werberat 2009 and 2012).

### 5.5.2 Bindingness

With regard to the binding nature of the Codes of Conduct, the German Advertising Council has kept records from the last 45 years of advertising regulation, which are informative both in terms of awareness of the codes and their effectiveness. An ever-growing number of complaints in the 2014-2017 data, in particular, indicates how consumers are taking active advantage of the opportunity to report violations. In 2017, around 15 reports were received every week. The reasons cited in the complaints are also of interest: gender-discriminatory advertising, general morality, discrimination and humiliation, endangering of children and adolescents, the risk of plagiarism, sexually explicit advertising, soft-pedaling of violence, violation of religious sentiments, and animal protection. This encompasses the entire breadth of topics covered in the codes of conduct.

That there is a high level of agreement between a self-regulatory code and the moral sentiment of consumers can be interpreted as meaning that the text of the voluntary agreement is well-known to the general public, or that the professional ethics has succeeded in addressing and reflecting the moral sensitivities of the general public. As the former is highly improbable, only the second attempt at explanation is worth considering. However, it is possible to draw conclusions from this for an ethics of algorithms: It could be concluded that a professional ethics succeeds in assuming a “Sitz im Leben” (situatedness) in life when it comes as close as possible to the moral convictions that the majority of people – without great reflection – believe to be true. Conversely, it is not strictly necessary for those working in a profession to know the exact wording of their code of conduct. It is sufficient to have a sense for problematic matters or develop such a sense in the course of dealing with the respective code of professional ethics.

As far as effectiveness is concerned, it is apparent from the records of *the German Advertising Council* that just under 90% (2017) (Deutscher Werberat n.d.b) of companies alter or discontinue the advertising in question following the first request from the Council, despite the arguably remarkable fact that their advertising activities are operating within the scope of what is legally permissible. In the few cases in which a censure is actually deemed necessary, the statistics show that these companies (with minor exceptions) have not gone one to “attract further attention.” We assume that the simultaneous existence of individual documents – with contents adapted differently to the requirements of the time, and to varying degrees of success – are certainly not the most convincing means of presenting a set of professional ethics to outsiders. Moreover, in view of the success of advertising self-regulation in Germany, the impression is created that the quality of a self-regulatory code tends to be overestimated in terms of bindingness.

However, it may be that it is easier to attract attention as a body of professional ethics when your field of specialization is the advertising industry. Advertising is present everywhere. Everyone will notice a provocative image, whereas violations in the areas of journalism and PR will only be perceived by those with a measure of media literacy. Yet it could also be that because consumers have developed a particular sensibility when it comes to advertising, a sufficient number of people have adopted a critical viewpoint over the years for the moral sentiment of the population to be able to function as a corrective. In turn, it is possible to interpret from this that, for an ethics of algorithms, it is beneficial to raise awareness among the general public of problematic content and processes, and in this way make them a stronger partner in matters of professional ethics.

### 5.5.3 At a glance – German Advertising Standards Council code of conduct

<u>Developmental process</u>

- *Reasons for existence*
  German Advertising Standards Council 1974–2017, objective: respond flexibly to current problems

- *Updates*
  Updated through the creation of new documents, some of which include original and updated versions of a document
- *Audience*
  Advertising experts
- *Form and accessibility*
  Self-regulatory code that draws on 10 documents, available at www.werberat.de (see Deutscher Werberat n.d.a)

Institutionalization

- *Complaint options*
  German Advertising Standards Council
- *Sanctions*
  Reprimands (if advertisement is not discontinued upon request)

Awareness and recognition

- *Self-conception*
  No data available
- *External perception*
  Public is aware of and takes advantage of opportunity to file complaints

## 5.6 Engineering

### 5.6.1 Background and history

The formulation of the first code of ethics for engineers coincides for the most part with the emergence of (British and American) engineering societies. In 1828, for example, Britain's King George IV signed a Royal Charter for the Institution of Civil Engineers (ICE), which was founded in 1818. A group representing British electrical engineers adopted a code of ethics in 1871, and in 1934, a Royal Charter was given to the British Institution of Structural Engineers (founded in 1852). In the United States, chemical engineers have had a comparable code since 1912, and mechanical engineers since 1914. In Germany, the Association of German Engineers (Verein Deutscher Ingenieure, VDI) was founded in 1856. While it also addressed issues relating to technology and ethics in the 19th century, its first code of professional ethics (Engineeer's Creed) was not published until 1950, after World War II. Elsewhere, the Austrian Association of Engineers and Architects (Österreichische Ingenieur- und Architektenverein, ÖIAV) deserves special mention, as does the Swiss Association of Engineers and Architects (Schweizerische Ingenieur- und Architektenverein, SIA), founded in 1837, and the comparatively younger Swiss Academy of Technical Sciences (Schweizerische Akademie de Technischen Wissenschaften, SATW), founded in 1981.

Few of these organizations featured explicitly formulated codes of ethics from the beginning. Rather, a professional ethos was implicitly referenced as a core element of their founding documents (e.g., in the stated purpose of their articles of association). For the most part, these early guidelines initially address standards for the professionalization of the engineering profession (code of conduct), aimed particularly at drawing distinctions relative to other professional groups. Given this goal, along with the additional objective of increasing engineers' societal reputation (prestige), we primarily see this first phase referencing values such as safety, efficiency, technical perfection, and responsibility (duties) toward employers and clients. Following World War II, these were increasingly complemented by ethical principles that sought to take issues such as public safety, the public interest, sustainable development and the complexity of technical innovations more strongly into account. For example, between 1976 and 1990 (in 54 working sessions), a set of VDI guidelines for technical assessment was developed with the aim of "promot[ing] awareness of the malleability of technology" (VDI 2000: 66)

In addition to the professional associations, there are chambers of engineers (state chambers) in all German federal states, as well as a Federal Chamber of Engineers, that regulate proper professional conduct through so-called rules of professional conduct ("Berufsordnungen"). In this regard, a resolution at the 22nd Federal Chamber of Engineers General Assembly on 6 March 1998 resulted in the adoption of a model set of rules of professional conduct, including an engineer's oath (the Termaximus). However, no additional information on this oath is currently available on the websites of either the federal or state chambers. Thus, it is perhaps not surprising that the oath has been disparaged as the "brainchild of an academic,"[12] and has disappeared almost wholly from the World Wide Web. Equally invisible today is the European engineers' moral code, which was adopted by a plenum decision at the 1st European Chamber of Engineers Assembly on 12 May 1998 in Dresden (the so-called Dresden Declaration).

On the European level, the European Federation of National Engineering Societies (Fédération Européenne d'Associations Nationales d'Ingénieurs, FEANI; founded 1951) has by contrast established itself as an advocacy group representing national engineering associations. In its position and policy papers, it calls publicly for ethical principles to be upheld. In addition, there is also a code of ethics for the globally active World Federation of Engineering Organizations (WFEO), as well as numerous codes

[12] The last digital traces of the oath's "insignificance" appear in the discussion on deleting the "Termaximus" Wikipedia article (Wikipedia 2009).

and guidelines from expressly scientific- and technological-watchdog organizations such as the Gesellschaft für Verantwortung in der Wissenschaft, the International Network of Engineers and Scientists (INES), and the associations Unterstützung internationaler Kommunikation kritischer WissenschaftlerInnen und IngenieurInnen (KriWi) and Scientists for Global Responsibility (SGR) (see Maring 2013). For those interested in further research, a comprehensive collection of national and international codes of ethics for engineers has been made available online by the Illinois Institute of Technology (IIT n.d.).

In a broader sense, computer-science ethical codes and codes of conduct can be assigned to those of the engineering world, insofar as computer scientists undergo professional training as software engineers. As we see in Chapter 5, however, this is not the case for all practicing software developers. In this regard, the English-language expression “software engineer,” in practice often used as a synonym for “software developer,” should not always be taken literally. In the German-speaking world, the software-development field is addressed most prominently with the ethical guidelines published by the Gesellschaft für Informatik (GI 2004), which also operates a website for the discussion of ethical case studies entitled “Gewissenbits” (GI n.d.).

### 5.6.2 Bindingness

The scope of application for the engineering associations’ codes of ethics (self-regulatory policies) principally extends (only) to members of the various organizations, which in turn can implement them through their internal rules. As part of a 1999 empirical study, about 40 organizations were sent a survey seeking to determine what institutional measures they had in place to support and enforce their members’ ethical responsibility. Nine of the 40 organizations that specifically addressed the responsibility of engineers in their codes returned the survey, and indicated that their members were automatically bound to observe their association’s internal ethical code, and could be excluded if they failed to do so (Reidel 2003: 222). According to the study’s authors, the Institute of Electrical and Electronics Engineers (IEEE) had made the most significant efforts to embed the code of ethics in institutional processes, and to create the necessary organizational structures for realizing and enforcing the code.

However, comparing the degree of acceptance and regulatory capabilities of U.S. and British codes of ethics with those in Germany is sometimes difficult, as they have different structures and intended audiences. While the U.S. and British codes primarily address the individual ethical needs and circumstances of self-employed or management-level employees, around 80% of engineers in Germany work in companies as regular employees (Maring 2013: 411). For example, operational standards, which in the United States are largely regulated by professional codes, are generally legally enshrined in Germany (professional law) and their bindingness is enhanced by obligatory membership in a chamber of engineers (which enforce rules of professional conduct). On this operational-technical level, the responsibility of engineers can therefore be broadly regarded as an ethic that has become law.

With regard to their (legal) bindingness, the VDI’s Ethical Principles of the Engineering Profession (Ethischen Grundsätze des Ingenieurberufs), formulated in 2002, rank clearly below the engineering sector’s professional law and rules of professional conduct. In contrast to the Dresden Declaration or the German Federal Chamber of Engineers’ Termaximus, which as yet have not been incorporated into the individual state chambers’ rules of professional conduct, the VDI’s code of ethics (VDI 2002) is freely accessible online and helps facilitate a broad public discussion on the issues it contains. From a substantive perspective, the 2002 VDI Ethical Principles – particularly through their reference to the supplementary VDI Guideline 3780 (Section 2.1) on technology assessment – go well beyond the very generally formulated appeals to responsibility contained in the preambles to the various professional codes of conduct. However, the Ethical Principles are not strongly binding for VDI members, and have not been supplemented by any internal sanctions, ethics commissions or arbitration bodies. Consequently, their effect beyond academic discussion has come at best in legal disputes in relation to general

clauses that must be fulfilled, for instance with respect to aligning action with public policy (see BGB, Section 138).

### 5.6.3 At a glance – Ethical Principles (VDI)

Developmental process

- *Reasons for existence*
  - Association of German Engineers 2002, objective: ensuring competence and promoting participation in the ethical discourse
- *Updates*
  - No update has taken place to date. However, the document is in the tradition of the 1950 "Engineer's Creed."
- *Audience*
  - Association members
- *Form and accessibility*
  - Self-regulatory code (eight-page internet document), available online at https://m.vdi.de/fileadmin/media/content/hg/16.pdf (see VDI 2002).

Institutionalization

- *Complaint options*
  - Unknown[13]
- *Sanctions*
  - Unknown

Awareness and recognition

- *Self-conception*
  - No data available
  -
- *External perception*
  - No data available

[13] For the "At a glance" items marked "unknown," we unfortunately received no official information from VDI. For this reason, the degree to which Maring's criticisms remain valid unfortunately could not be verified: "However, since the introduction of the VDI's Ethical Principles, it has been altogether too quiet. A broad public discussion would have been desirable; in particular, however, the Fundamental Principles should have been made binding for VDI members and should have been supplemented by the creation of legal or internal sanction options, ethics commissions and arbitration bodies" (Maring 2013: 414).

## 5.7 Table

| | Medicine | Social work | Journalism | Public relations | Advertising | Engineering |
|---|---|---|---|---|---|---|
| Reasons for existence | German Medical Association, objective: effective self-regulation | DBSH 1997-2014, objective: professionalization of the social-work field | German Press Council 1973, objective: effective self-control as alternative to state control | German Public Relations Council 2012, objective: bundling similar documentation, standardization | German Advertising Standards Council 1974–2017, objective: respond flexibly to current problems | Association of German Engineers 2002, objective: ensuring competence and promoting participation in the ethical discourse |
| Updates | Regular updates to the Model Professional Code (most recently in 2015; Geneva Declaration Physician's Pledge updated in 2017); the code is also adapted to specific conditions within individual federal states | In coordination with, and making reference to, the IFSW international code of ethics | Regularly, most recently March 2017 | No new version, however the Communication Code (Kommunikationskodex) is to be viewed as an update of various codices (since 1961) | Updated through the creation of new documents, some of which include original and updated versions of a document | No update has taken place to date; however, the document is in the tradition of the 1950 "Engineer's Creed" |
| Audience | Physicians | Social workers (youth-support workers, teachers for special-needs populations, child-care providers, and so on) | Journalists | PR and communication experts | Advertising experts | Association members |
| Form and accessibility | Professional code of conduct, availalable online at Bundesärztekammer (2015) | Self-regulatory code, published in the Verbandszeitschrift des DSBH (2014) | Self-regulatory code, available at Pressekodex (Presserat 2017) | Self-regulatory code, available at Kommunikationskodex (DRPR 2012) | Self-regulatory code, available at Werberat (Deutscher Werberat n.d.a.) | Self-regulatory code, available at VDI (VDI 2002) |
| Complaint options | Professional-law proceedings following a breach of professional duties | Ombudsoffice within the DBSH Professional Chamber | Press Council | German Public Relations Council | German Advertising Standards Council | Unknown |
| Sanctions | Various levels depending on severity (warnings, reprimands, fines of up to €50,000, withdrawal of active and passive chamber voting rights, determination that the accused is unworthy to exercise his /her profession | Under the association's jurisdiction | Reprimands | Reprimands | Reprimands (if advertisement is not discontinued upon request) | Unknown |
| Self-conception | Sufficient; is an aspect of licensure | High level of identification among practitioners, and very active use of the ombuds office | Is part of the journalism profession's self-conception | Awareness and recognition growing in recent past | No data available | No data available |
| External perception | Public is aware of a code of professional ethics (Hippocratic Oath), Hippocratic Oath serves as a model for other professional ethics codes | The association's magazine, "Forum Social," is published four times per year; in addition, information on the guidelines is regularly provided to universities and interested groups. | Sufficient, is used as a model for other codes of professional ethics | No data available | Public actively aware of complaint option | No data available |

# 6 Delimiting the “algorithm design” profession

Before we systematize the results of our analysis of the various professional ethics and apply them to the algorithm-design profession, one more intermediate step is required. If we are to derive conclusions for this occupational field from the analysis, the field itself must first be more precisely defined. Thus, the following sections go well beyond a simple description of the profession. In order to develop specifications for a professional ethics, it will be useful to take a deeper look at this professional field’s developmental history and ethos.

Any delimitation of the actors involved in modeling and implementing socially relevant algorithms must also take into account the environment and the business context associated with digital transformation processes. Digital development projects take place against the background of new and often disruptive technologies, as well as the globalization and acceleration of markets, radical changes in user and customer behavior, perpetually shifting societal conditions, and a rapidly growing degree of complexity. The business and management-consulting sectors refer to these conditions using the acronym VUCA (volatility, uncertainty, complexity and ambiguity). Consultants and other writers frequently argue that in parallel with the digital transformation, changes in company leadership culture and organizational structures are needed in order to successfully cope with these environmental factors (see Dörr, Albo and Monastiridisv 2017).

However, before we go more deeply into these organizational changes, we should examine the essence of the profession. Algorithms determine the way software functions. Software development essentially aims at the (automated) storage, processing and transfer of information. In Germany – following the work of cyberneticist and information theorist Karl Steinbuch – this task area was traditionally classified under the category of computer science (European Commission 1988). The professional description of “computing professional” – following the International Standard Classification of Occupations – was assigned to the top-level category of “Professionals,” as well as to the underlying upper category of “Physical, mathematical and engineering science professionals” (see Eurostat 1988).

The professionalization of computer science was driven by the establishment of an independent scientific discipline at the beginning of the 1960s. The increasing significance of electronic data processing soon gave it the character of a cross-cutting discipline. Through its differentiated application within other scientific disciplines, computer-supported information processing increasingly developed from a specialized domain of physics, mathematics, logic and electrical engineering into a fundamental element of academic research overall. Over time it came to have an impact on an increasing number of professional fields, a phenomenon that continues today. There is no obvious end to this development in sight. Indeed, quite the contrary is true; given the scope of the influence noted above, this process only seems to be picking up speed again.

Yet what lies behind this dynamism? Is there a motivating force that explains this development or the actions of the actors involved in the trend? The thesis we would like to briefly sketch in the context of our initial work on a professional ethics for algorithm developers runs as follows: Professional ethics evolve genetically, as the result of experimental value-guided activity. The central motivating force and first rules of the professional field can be distilled from a long tradition of algorithmic thinking.

To this end, we will use the next section to take an initial look across the historical horizon of algorithmic thought. Please note that this review does not intend to examine the historical development of algorithms in all its detail.

We would like to stress at this point that human problem-solving strategies have always been connected with algorithmic thought at the deepest level. We have always – not simply beginning with the existence

of computers – sought to outsource algorithms to representational aids or man-made artifacts; moreover, this process of transfer and automation has always required a myriad of experts from very different professional fields. However, in the 20th and 21st century, physical apparatuses increasingly recede in importance as compared to the activities of the software-development field, so that the context in which algorithms are applied in our era can primarily be defined by virtual machines, programs and data.

In the next step, we will then schematically present the occupational environment of software developers within the business context. In so doing, we are guided by the procedural perspective offered by Katharina Zweig (2018), which enables us to illustrate the dialogical character of relationships between individual business or subject areas and developer teams. This conceptualization serves as a first draft, offering a substantive perspective for a detailed analysis of software developers’ internal and external dependencies. However, in the context of this preliminary work, this aspect cannot be further elaborated.

In the third and last step, will describe the most important functions or roles associated with developing and embedding algorithmic decision-making systems. This section is intended to provide a rough overview of the differentiation within the profession. To this end, we offer a summary of basic activities, delineated by function. The goal is to provide initial points of reference for determining each role’s degree of design responsibility.

## 6.1 Historical development

The term “algorithmist” (Algorithmiker) as description of an occupational activity is linked to the dissemination of a particular mathematical procedure that spread slowly to Europe from Baghdad in the 12th century. The name itself derives from the proper name of the mathematician al-Ḫwārizmī, born around 780 AD, who taught calculation based on the Indian method in Baghdad and published mathematical treatises on this topic, which we know comparatively more about today (see Ḫwārizmī, Folkerts und Kunitzsch 1997). Mathematicians who used this new method of calculation were subsequently referred to as algorithmists, in contrast to the abacists (abacus users; see Ziegenbalg, Ziegenbalg and Ziegenbalg 2016).

However, algorithmic thought is in its essence much older. Generally conceived, algorithms describe regular processes that are defined on a step-by-step basis, and can be repeated (see Mainzer 2014: 275). Ritualized actions taken in order to carry out a concrete task or solve a defined problem are in this broad sense the first forerunners of algorithms. Such activities have existed in more or less precise form as long as there has been human language. The two most important requirements for a good algorithmist emerged in the course of evolution and are rooted deep in our human nature (ibid.). These are a) the ability to reflect upon one’s own thought (reflective faculty), and b) the capacity to order or structure this thought in a system of signs that is as clear as possible (abstraction faculty). At this higher level, an algorithm may accordingly be qualified as an elementary aspect of our thinking that we have understood well enough to transfer into signs or symbols (see Stiller 2015: 10).

Even in the early days of human history, relationships of ownership (values) were transferred to external storage mediums such as notched wooden rods, counting sticks, counting stones, and other such numbering mechanisms. These first transformation processes form the basis for economic calculations that were operationalized through simple calculation operations (rules) in order to better organize the management of goods within a community. Private businesses were certainly interested in these procedures, a fact that over time resulted in the merchant profession. However, symbolic representations were in this context primarily used to produce official records referring to land and people, thus originating the occupation of the (state) official (see Menninger 1958).

Mathematical calculations and algorithmic procedures soon led to numerous technical innovations, marking the origin of engineering. Independently of the inventions and ideas of the ancient Mediterranean cultures, a center for this technical progress emerged in China, largely based on a particular mathematical treatise (the Jiŭzhāng Suànshù). This work contained recipe-like procedures that led to an early algorithmization of mathematics in China (Fangcheng algorithm), and remained the standard work for Chinese researchers, thinkers and draftsmen from the first century through the next 1,500 years. An extraordinary flowering of the engineering arts also took place in the Alexandrian school under the tutor Heron, who had already developed an automatic temple-door opener by around 60 AD. In this mechanism, a complicated algorithm made sure that the gate opened as soon as a fire was kindled in a bowl.

While mathematical findings certainly opened up new opportunities for engineers, they also had an impact on numerous other occupational areas, thus continually forming new scientific disciplines and professional fields. Algorithmic thinking, as expressed in its recipe-like form such as in the practice of medicine – particularly in pharmacology – was recorded in unambiguous steps that were as precise as possible, so that any individual who applied the recipe to the same input would obtain the same results (medication). Any strict demarcation of a precise field of activity thus appears difficult even today, as this rough-grained view into the past of algorithms shows. This is because the conception of an algorithmic solution procedure for medical professionals, architects, construction engineers, merchants, financial and economic officials, and so on always also depends on specialist knowledge from the relevant domain of expertise.

The methodical measurement of the world with figures and values, which reached an interim peak with Leon Battista Alberti in the early Renaissance period, underscores the particular importance attributed by early algorithmists to identical reproducibility in their processes of written calculation. Alberti’s nearly obsessive concern with precision and his fear of careless copyists who might distort his manual digitization techniques has been comprehensively documented (see Carpo 2011). However, the failure of many of his ideas, such as his three-dimensional body scanner (de Statua, around 1435), already revealed the dependence of complex measurement and calculation procedures on the appropriate calculation instruments. Computers began to gain currency as aids for his methods only 500 years later (which already indicates that the term “big data” can also be understood as a relational concept).

In the 17th century, scientists such as Gottfried Wilhelm Leibniz, René Descartes, Blaise Pascal and Thomas Hobbes sought to overcome the fallibilities of human calculation by using new devices. Their common occupational ground rests in the fact that they were active both as mathematicians and as philosophers. Mechanical calculation aids date back more than 4,000 years, to Pythagorean calculation-stone arithmetic and the abacus, which gained a dominant position in a number of very different cultures. However, with the conception of artificial languages, which organize deductive thought as a calculation, and the invention of “symbolic machines” (Krämer 1988), scientists in the 17th century (seeking to realize their philosophical conceptions) now sought to mechanize rule systems themselves. The first calculating machines produced by Wilhelm Schickhardt (1623), Blaise Pascal (1642) and Gottfried Wilhelm Leibniz (1674), which enabled the outsourcing and automation of written calculation processes, were thus the work of philosophers and theologians.

Although Leibniz used the decimal-based calculating system known through al-Ḫwārizmī in the construction of his calculating machine, he also made an essential contribution to the theoretical foundation of the binary calculation system. Moreover, he also developed early ideas regarding the logical formulation of phrases in a universal language of calculation, with the goal of exposing human errors as calculation failures. With the work of George Boole in the mid-19$^{th}$ century, the boundaries of traditional logic, with its origin in Aristotelian syllogistics more than 2,500 years ago, were once again shifted forward. In this newly established field of mathematical logic, Boole interpreted the symbols 1 and 0 for propositional logic statements respectively as “true” and “false.” This in turn provided the groundwork

for a “mathematical physics” (Krämer 1988) that enabled the description of logical conclusions (thoughts) as quantifiable facts, and the translation of the entire rule system of physical processes (into computer code).

The projection of algorithmic thought into man-made artifacts was then famously electrified in the course of the industrial revolution. In addition to engineers, it was then primarily physicists and electrical engineers such as William Shockley, John Bardeen and Walter Houser Brattain, just to name a few, who prepared the way for one of the three most significant technical leaps of the newer computer technology.

Alan Turing too arrived at his clarification of the algorithm concept through the analysis of the behavior of a human calculator. The Turing Machine mechanism, which is required for the execution of an algorithm, was recognized as being independent of the objective apparatus on which it is executed. This resulted in the idea that the human mind has the same relationship to the brain as software to the hardware of a computer. The idea of man as an information-processing machine that to a certain extent can be guided and controlled externally took firm hold, and was further developed in numerous new fields of scientific research (cybernetics, cognitive science and functionalism, to name a few).

The fact that current AI research (particularly the modeling of neural nets) has once again largely abandoned the strict distinction between software and hardware supports our thesis that the rules of this professional field – from its historical development and theoretical foundation through today’s currents and trends – are built up as the outcome of experimental activity, and that even today, human thought and activity serves as a central model for information-technology applications.

With the availability of comprehensive real-time data (big data), cybernetic models for controlling machines, organisms and society (Wiener 1948) are again gaining in importance. Indeed, though the development of all-encompassing IT systems (smartphones, Internet of Things (IoT), Industry 4.0, etc.) and machine-learning algorithms, the old cybernetic concept of feedback (i.e., a control unit reacting automatically to a change in conditions) is simply attaining its originally intended quality (we outlined a comparable dissonance between existing hardware and software capabilities above, in the context of Alberti’s work).

This qualitative change due to the gradual displacement of traditional data analysis – in which a traditional analyst (statistician) processes specific data (such as business data) for other people (e.g., in the marketing or operations departments), in order that people (leadership personnel) can react accordingly – is particularly significant. In the case of algorithmic decision-making (ADM) processes, which we will use in the next chapter to further delimit the professional field, a team of subject-area experts, developers and data scientists model data no longer as a fixed end point to be communicated to people, but rather as a starting point for self-learning control units that manage dynamic data pipelines running between the sensors of networked machines.

### Interim findings 1:

The observation, modeling and interpretation of algorithmic transformation processes is part of a long tradition involving the methodical teaching of rational and goal-directed thought. A core motive for the displacement of algorithms into man-made artifacts is to operationalize human thought and action in order to eliminate errors in reasoning. To the degree that certain physical and mental activities can be described as calculable functions, these activities can be mechanized and performed just as well by machines (computers) – indeed, as judged by effectiveness and efficiency, generally even considerably better. This kind of burden-shifting strategy can be traced far back into our past and is not reducible solely to the activity of technicians or engineers. However, such a strategy always requires an abstract

understanding of the functional circumstances and processes that are to be achieved in the real world through the procedure’s implementation. In the past, mechanization or automation typically produced a change rather than a reduction in the activities carried out by people. Before we explore how the new professional fields are differentiating themselves, we will first use the following section to give greater specificity to the environment in which these changes are taking place.

## 6.2 Embedding in the corporate context

Digitization as a motive in operationalizing a specific data-driven way of thinking is not new. However, the "digitization tornado" (see Dueck 2017) that has been causing a sensation in all manner of business sectors and institutions in recent years most certainly is. The need for dynamism and speed mean that agile development methods such as Scrum, Kanban, Lean Start-Up, Design Thinking, etc., are becoming increasingly prevalent in the organization of software-development projects. An experimental approach, which we have already illustrated as an elementary component of the profession, is exemplified by the Silicon Valley motto of "Fail Fast,” which has become a mantra in the IT sector. The emphasis on the temporal dimension underscores the importance of agility for those involved.

If the current situation in the IT sector is compared with the realities of the early 1990s, it becomes clear (above all in the end-customer segment) that digital products are no longer required to exhibit the same degree of maturity before they are made available to users. Accordingly, the idea of the fully developed software solution that is purchased at the shop counter in the form of a CD or DVD is already a thing of the past. Because all of our devices are (more or less) permanently online, a “minimum viable product” (MVP) is already sufficient in order to test market requirements, and with manageable effort. Customer feedback subsequently flows into the next round of development, thereby expanding and enhancing the product step-by-step.

In practice, a frequent consequence of iterative product development is a blurring of the boundaries between project and process management. As long as a digital product is in operation, there is no end to the project. Differently expressed, any given sprint – that is, every round of iteration up to the next operational product version – can be designated as a small development project, or simply as a phase in the digital transformation of an entire enterprise.

In this regard, we build on the procedural perspective adopted by Zweig (2018), as this provides an activity-oriented insight into the various functional areas of software development. The functional and organizational separation between Demand IT entities and Supply IT entities has proven successful in practice. In this model, the *Demand IT entity* coordinates the requirements of the different business divisions and translates these into a project specification. The *Supply IT entity* or *IT Delivery division* is responsible for the realization of a corresponding solution.

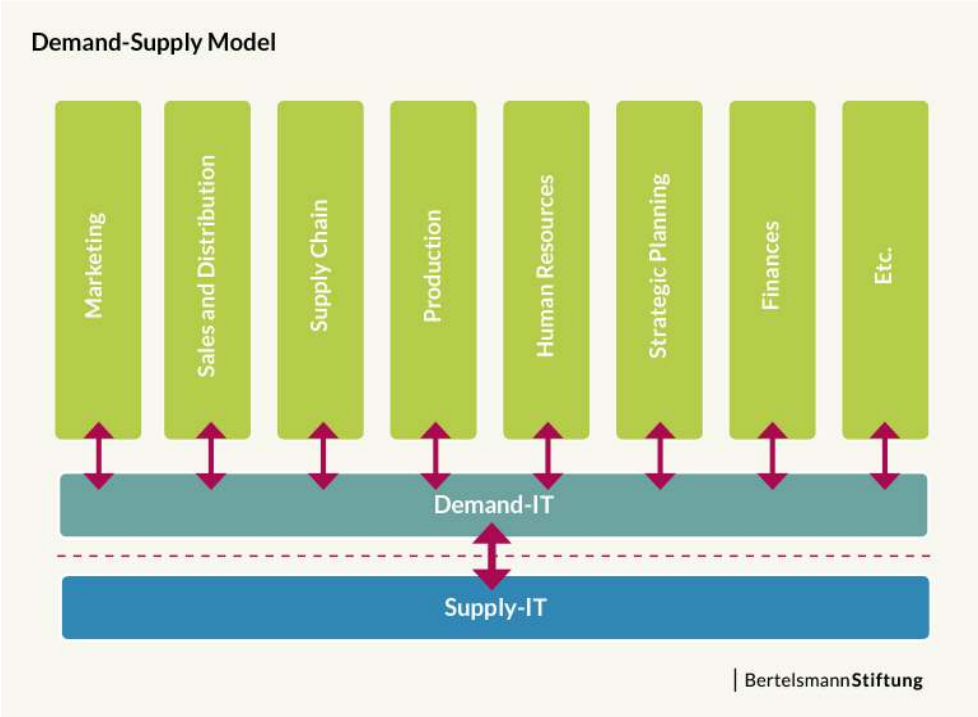


*Figure 2: Demand-Supply model* (Source: own illustration)

Our schematic representation of the organizational environment (see Figure 2) does not claim to encompass all organizational variations of Demand-Supply Management. For example, not every company has an in-house development department. In smaller companies, individual IT specialists may also be directly assigned to a specific business division. In addition, the internal IT or digital division often functions exclusively as a Demand IT entity, whereby development is entirely external, or augments the internal development team (Supply IT) with external developers, and so on.

Here, the model serves only to aid the understanding of the information flow in the formulation of software requirements. Initially, the desired functionalities are introduced into the agile software-development process by employees from a specific business or specialist division, usually in the form of a so-called Epic (a sketch or very roughly formulated application description). The Demand IT entity then includes this requirement in the so-called Product Backlog (a pool for all product requirements) and decides which requirements should be implemented in the next development sprint. Once an Epic has been assigned to a sprint, the Demand IT, together with the Supply IT, breaks down the Epic into numerous “User Stories.” In effect, this is an initial transformation from the abstract to the concrete, which already provides the developers with the most important functional details for later implementation, and furthermore provides Demand IT with the opportunity to coordinate these functions with the respective specialist or business division.

The term “User Story” already provides a valuable indication that customers and/or users should actually be made the first link in the *Demand-Supply Chain*. With regard to the implementation of machine-learning systems and algorithmic decision-making processes, the process of customer-specific personalization, for example in relation to context-sensitive recommendation technologies and adaptive (“ontology-based”) user interfaces, has acquired a new quality.

### Interim findings 2

The procedural approach to software-development projects enables an initial approximate view that reaches beyond the horizon of the core development team (Supply IT). This underlines the dialogical nature of the relationship between the different business divisions within companies (strategy, marketing, sales, etc.), which prepare a first rough definition of requirements and the development teams. Moreover, customers’ usage behaviors directly influence the design and functionality of software solutions, both explicitly through the integration of fast feedback loops and implicitly through interaction with machine-learning systems. In order to operate more flexibly on the market, but also because of the high number of independent IT experts, the Demand & Supply IT entities are frequently supplemented by external service providers or even provided entirely by outsourced digitization agencies.

## 6.3 Functions and roles

With regard to the development and embedding process of algorithmic decision-making systems, Zweig (2018: 15) defines scientists, computing professionals, data scientists and decision-makers at the state and economic level, as well as scientific NGOs, as responsible actors. The concept of “T-shaped skills,” as noted in our brief historical background discussion, describes the requirement profile which is found today in numerous job advertisements, describes the requirement profile, as identified in our brief historical background discussion. The vertical line of the “T” symbolizes in-depth expertise in a particular knowledge domain, such as in a particular field of science or business, insider know-how with respect to a particular technology, or extensive experience in the use of specific methodologies, etc. The horizontal line of the “T” describes the ability to collaborate efficiently and productively with experts from other disciplines, that is, the ability to quickly understand and incorporate new topics or other disciplines.

Keeping with the alphabetic metaphor, the management level calls for people with so-called X-shaped skills. In addition to proven specialist expertise and the ability to support different development teams, such people are characterized by distinctive leadership skills and a high level of strategic competence.

The dialogical nature of the relationship between the individual business or specialist divisions, the technology-savvy intermediaries (Demand IT) that coordinate the IT project planning and project management (innovation management, IT controlling, etc.), and the developers (Supply IT) has already been set out. The following section describes the most important functions or roles that are relevant in a more narrow sense in the conception, modeling and development of algorithms (software).

### Product Owner

The *product owner* is the contact person for all requirement requests; he or she controls and coordinates the Product Backlog and serves as the specialized point of authority for the various business or specialist divisions (customers).

### Business Analyst

The *business analyst* functions as an additional link between the specialist divisions and the development team. This person analyses the business architecture of the company inasmuch as he or she identifies the state of a company, describes opportunities and problems, and outlines, defines, models, visualizes, specifies, evaluates, structures, prioritizes, verifies, validates and communicates requirements. In the case of a highly technical orientation, the occupational title of *functional analyst* is also common in this context.

### Project Manager

In theory, the *project manager* (PM) is no longer required in the highly process-oriented approach of agile software development. In Scrum, for example, the area of responsibility and the classic activities of the PM are split between the product owner, the Scrum master and the developer team. However, in practice the role continues to be relevant, in particular with regard to the coordination of numerous stakeholders, product owners and development teams.

### IT/Solution Architect

The word architect comes from the Greek and essentially means “supreme craftsman.” IT architects are more generalists than specialists and keep an eye on the big picture. As such, they ensure that the initial sketches develop into a viable and functional overall solution.

### UI/UX Designer

The *user experience designer* analyses user and usage behavior and develops solutions to improve the utility, usability and likeability of the product. He or she translates the functionality of the product into a graphical user interface (User Interface Design) and, vice versa, uses the design specifications in order to specify the functionalities of the product.

### Programmer

The *programmer* translates the somewhat abstract requirements into an executable program (code) that can be run on a computer. Prior to this, the requirements are described in natural languages (Epics, User Stories) in the design phase and further specified by an analyst, architect or designer, for example by using a program flowchart (UML etc.), a structogram (wireframes etc.) or by click prototypes (mockups).

### Test engineer

A *test engineer* develops a strategy for testing the software functionality, verifies that the defined requirements have been implemented in line with specifications, and measures the quality. The knowledge gained in these processes is documented, and serious bugs are reported directly back to the developers. To avoid jeopardizing the completion of the current product increment, bugs that are not “showstoppers” but are rather classified as a change request or suggestion for improvement generally move first through the product owner into the Product Backlog for a later development sprint.

### Data scientist

The role of the *data scientist* became increasingly important in companies from around 2010, in particular companies active in the field of big data. The idea that it is possible to derive all necessary skills from a cross section of existing developer roles is at the heart of the data scientist model. The data scientist is frequently defined as a quantitative analyst, hacker, scientist, economist, and trusted adviser who is also capable of rendering his or her data-based insights in an appealing and easily understandable way (Davenport 2014).

### Citizen Data Scientist

The citizen data scientist represents a new role on the stage of data-driven application development. Because there are few experts that can fulfill all of the above-mentioned criteria of the data scientist, and because there are ever more tools that allow the analysis of large amounts of data on a more abstract level, this role is becoming increasingly important. For a citizen data scientist, it is therefore sufficient to have sound knowledge of a specific business or domain of business, and to understand how to operate an applicable big data tool.

# 7 Conclusions

In the previous chapter, we explored the issue of an algorithm ethics as a form of professional ethics through the lens of several different occupational fields. By taking this broad approach, our goal was to develop the foundational basis for meaningful discussions regarding an ethics of algorithms for the future. We turn now to an assessment of each in terms of the primary focus of this research in which we identify the success factors of professional ethics and what this means for establishing an algorithm ethics.

By taking a closer look at six different professional ethics – in medicine, social work, journalism, public relations, advertising and engineering – and by excluding less-successful models such as user ethics, we could identify a manageable number of general criteria for success that appear to play an important role in establishing such ethics. These ten criteria describe different “moments” of success. As such, they need not all be in place simultaneously and the absence of a certain number of criteria is not enough to make any predictions regarding a negative development. Indeed, as the examples presented in our analysis show, strengths in one or more areas can very well compensate for weaknesses or deficiencies in other areas.

## 7.1 Historical tradition

One of the primary criteria for success is the presence of a historical tradition. A professional ethos that grows from generation to generation, adapting over time as it deals with changing requirements while sharpening its focus, has a clear advantage in raising awareness and promoting acceptance of a professional ethics. Worth noting, however, is that the supposed absence of a historical tradition can to some extent be compensated for by efforts to reflect on hitherto little-known or acknowledged historical roots and to integrate these into a positive narrative about the profession.

Although the roots of algorithms can be traced back to the origins of human thought (see Chapter 5.1), no specific profession per se has to date emerged. However, as discussed in our historical review, the activity of algorithm design has changed dramatically over the last centuries and, over time, has become a specific discipline within several different professions. In short, it has become an interdisciplinary pursuit. Given the uncertainty in public debates as to what algorithms actually are, an important first step could involve exposing the roots of algorithms, shedding light on the ethos of those who first created algorithms, and tracking the impact of algorithms on our present-day situation. Delineating algorithms in this manner could help classify them in such a way as to render them more understandable to the public and experts alike, which, in turn, could clarify the definitional boundaries between the various professional fields.

## 7.2 Personal interest

As is the case in many other areas, in professional ethics, the question of personal motivation is of crucial relevance. When people perceive moral norms as being externally imposed upon them by others, they are unable to identify with them or follow them simply as a matter of course; moral philosophy is repeatedly compelled to demonstrate its relevance. Doing so takes considerable energy that could otherwise be invested in a constructive debate. Similarly, a professional ethics is more likely to have impact when the members of a profession share a socio-ethical awareness and are personally committed to ensuring these standards. Of course, where absent or in cases where not sufficiently developed, this

kind of consciousness can be developed and promoted, though this requires a focused debate and ongoing effort.

Several initiatives have pointed out that a growing number of algorithm developers are addressing (or at least want to address) the consequences of their work, as they are very much aware of the impact of their activity. In the introduction, we noted the call among artificial intelligence researchers to draft a Hippocratic Oath for AI research. A student-driven initiative based in Munich, the ConsciousCoders project, is worthy of attention as an example in this regard. True to its “Think before you code” slogan, the group has begun to consider carefully the social consequences of big data and AI. It is important to provide initiatives of this nature with professional support in developing ethical guidelines. However, the intent here should not be to force the emerging IT elite into a moral corset but to moderate an inclusive process in developing guiding principles. After all, there is nothing new about posing philosophical questions in technology. Nonetheless, ethical reflection is not the focus of technical education. Strengthening networks between this area and practical philosophy could prove beneficial in helping AI experts as they consider how to go about developing an ethical code. A first step in the right direction could involve issuing a few guiding principles or a (broadly) generalized mission statement.

## 7.3 Situatedness

A professional ethics can also yield a positive impact when it has situatedness, that is, when it is situated within a life context and therefore meaningful for both practitioners and their clientele. This criterion requires that a certain level of awareness and recognition be established and that interest in debate be present. When a professional ethics plays a role in discussions among a profession’s practitioners and among those external to the field, when it is repeatedly referred to and its makeup discussed or even subject to debate, it has achieved what we refer to as situatedness. It has become embedded into society and therefore neither the profession itself nor politics or the public can simply ignore it. Whether or not this professional ethics is presented as a single codex or a series of visionary documents or oral tradition is less relevant. Its visibility and the extent to which it is acknowledged are much more important.

An ethics of algorithms gains relevance for practitioners as well as their clientele once (at least) a basic understanding of the issue at hand is shared by both sides (this point can be tied to the discussion of our first and second criteria). Against this background, digital education is just as essential to a fruitful dialogue as is socio-ethical awareness. For all the problems and challenges currently associated with this, both in theory and practice, there are encouraging signs: both moral norms and “algorithmic thinking” are fundamental elements of the human capacity to engage in reflection (see Chapter 5.1). In other words, both of these “investments” are already present. In order to ensure both a secure situatedness, our task is to repeatedly tap into these capacities and to establish an “as pluralistic as possible” dialog.

## 7.4 Group character

Another criterion determining success is group homogeneity. It will be easier for individuals to identify with the group and the values it represents when a professional ethics is derived from an occupational field that has developed organically. This kind of homogeneity can predate the code of ethics but can also be the product of deliberate efforts to create a shared self-conception. The potential for group identification lies not only within engaging in the same or similar activity, but also in the process of self-definition. In the latter case, some characteristics or objectives are formulated through this process and become definitive for inclusion within the professional group. The advantage of such a process steered in this manner is that achieving a shared commitment to certain values is in effect a smaller step than is achieving a sense of community by emphasizing the similarity of tasks.

In practice, there is no homogenous group of professionals working in the field of algorithm design. Although a review of current job postings for work in the areas identified in Chapter 5.3 suggest otherwise, the people engaged in defining and realizing algorithms are not limited to those with IT degrees or similar qualifications. A procedural view of software-development projects, particularly when combined with the Demand-Supply model (see Chapter 5.2), underscores the dialogic nature of interaction between various specialist areas and business domains. Group heterogeneity increases as additional factors such as user behavior (which can have a negative impact on data quality) or the differentiation between internal and external co-workers are considered (see interim findings 2). If ethical principles are to withstand the pressure of economic constraints and do justice to the dialogic nature of interaction between clients (e.g., management, specialist divisions), intermediaries (Demand IT) and contractors (Supply IT), a deeply positive linkage to the overall organizational architecture must be established. Common basic ideas should be formulated as clearly as possible and as broadly as necessary.

## 7.5 Professional training

Professional training is clearly a key factor in creating a sense of community within a profession. Training provides the opportunity for individuals to examine their profession more closely and thereby fosters a sense of "us." It also helps moral standards become a core competence within a profession and thus makes them a matter of shared concern. Establishing modules within training that are designed to address issues regarding professional ethics can strengthen the awareness and recognition of such standards. Ideally, those who complete such training should be encouraged to perceive their ethical competence as an element of their expertise. The goal of such training should therefore be that practitioners consider themselves to be good doctors, journalists or computer scientists not only when they have acquired the required technical know-how but also when they have acquired the capacity to properly navigate the moral-philosophical challenges inherent to their field of work.

The term "algorithmist" is used to denote a profession that is distinct from the abacists of the late medieval period and Renaissance (see Chapter 5.1). The term is therefore not new. Over the centuries, creating algorithms as a vocation has emerged from the combined efforts of mathematics, logics, complexity theory, statistics, computer science and artificial intelligence to become a specialist area within a variety of disciplines and vocational trajectories (interdisciplinary field). It remains open to question whether the broad field of algorithm design can be clearly distinguished from other established professions. Should this indeed prove to be impracticable, algorithm ethics would have to be integrated into those codices that apply to the most closely related professions such as computer science or (software) engineering.

## 7.6 Institutionalization

Moreover, the extent as well as manner of institutionalization is decisive for the success of a professional ethics. Well-established professional associations that are known to the public and are also held in high regard provide a solid basis for a functioning ethics. In contrast, the situation is more challenging when the interests of a professional group are represented by a large number of smaller – possibly even competing – organizations and associations, or when no (or scarcely any) institutionalization has taken place. The greater the strength of an association, the greater the interest in becoming a member – insofar as membership is not compulsory. In turn, the greater the interest and/or necessity to join, the sooner the members will actually endeavor to contribute to the moral guidelines of this association. The question of the reasonableness of compulsory membership will not be discussed here, but it can be

stated – without making a judgment – that the options to exert pressure are, understandably, significantly greater in such constellations.

Certainly, there is no shortage of ethical guidelines and principles for dealing with socially relevant algorithmic processes – from Asimov's Laws (1942) to the Digital Manifesto (2015) or the Asilomar AI Principles (2017), to name just a few well-known examples. These attempts to address the issue are undoubtedly helpful in making the characteristics of the problem more accessible to a wider public and for initiating a social discourse. However, declarations of moral self-regulation can only contribute to the professionalization of the new data-driven professions if they are institutionalized for a particular occupational group in the sense of professional regulation. This was the approach taken last year by the authors of this study while guiding the Digital Analytics Association Germany e.V. (DAA) – with the aim of further reinforcing the statutes (§2 section 3) by adding their own code of ethics. As the evolutionary history of the numerous codes in the field of engineering (Chapter 4.6) demonstrates, stating in concrete terms what is expected can help sharpen the profile of the respective entity. As already mentioned on several occasions, the occupational group for which a professional ethics is to be established, must be distinguishable from other occupations. Here, we will not venture as to whether there really should be a professional ethics for "algorithmists." It may involve expanding the ethics codes of established professional categories and creating new standards and norms for these professions – as is currently being pushed by the world's largest technical association, the *Institute of Electrical and Electronics Engineers* (IEEE). However, it seems equally realistic that with digitization, new professions of which we have no idea today will be created, and these will eventually seek to organize themselves institutionally in some form or other.

## 7.7 Sanctions

This also applies to the option of sanctions, which is yet another criterion for ensuring that professional ethics succeed. Business life and daily work can entail a multitude of conflicts of interest and laws, which is why normative approaches based solely on the moral idealism of the individual are rarely concise. In addition to relying on the belief that representatives of the professions always strive for the good, a professional ethics is therefore well advised to employ sanctions as stop signs and/or an incentive system to point the way toward moral excellence. In order for sanctions to be effective, they do not necessarily require the clout of employment bans or fines, as can be the case for extreme cases in systems with compulsory membership. Frequently, the fear of a loss of reputation, as might follow a public censure, is sufficient. Nevertheless, whether such censures can have an effect depends in turn on the status accorded to the respective association by the general public.

In Europe, the new General Data Protection Regulation (GDPR) ensures compliance with a minimum of ethical values, for example, with regard to transparency, informational self-determination and privacy. Violations of this "legally-specified ethics" can result in heavy fines (up to €20 million or 4% of the previous year's global turnover). Although the GDPR can be considered to be greatly valuable and an improvement as regards possible sanctions, the application of this legal regulation in practice remains to be seen at this point. Moreover, the GDPR is no substitute for the ethical discussion on value creation through the use of data. To consider just one example, the GDPR is based on a minimal concept of autonomy as regards informational self-determination. The mandatory declaration of consent usually only involves an informed consent for a rather sweeping use of the data. By way of illustration, reference should be made here to the customer privacy policy used by Tesla, which grants highly extensive data utilization (see Tesla n.d.) and in the event of objection, threatens the "inoperability" of the customer's vehicle. Of course, there is a long way to go from there to the maximum requirement for autonomy, which grants the data contributor de facto sovereignty over their own data. European incentive systems could lead to a competitive advantage and a gradual improvement of digital self-determination.

## 7.8 Material context

A banal but potent factor of success is the material, predominantly monetary context. The development of a professional ethics or the ongoing process of updating an existing ethics in order to keep it alive and intact is indubitably a challenge that, in addition to the good will and commitment of those involved, requires financial resources. In this context, the question arises on the one hand as to whether such resources are available, and on the other, whether the willingness exists to use resources in this manner. As in many other areas, the willingness to invest money also gives an indication of the value (or lack thereof) that is placed in a particular matter, in our case the establishment of a robust professional ethic. If an association decides to initiate a professionally supported process in which the status quo as well as concerns and convictions of the practitioners are raised, resulting in the elaboration of a professional ethics, it will not be a guarantee of their eventual success, but is nevertheless a good precondition.

In order for the code of professional ethics of an association or organization to be accepted by its members, it must be credible and authentic. Theoretically, it would of course be possible to “buy in” to a professional ethics – that is, top-down – from a small number of experts as cheaply and quickly as possible, in order to “sell” it to the members. However, this approach will not necessarily help refine the self-conception of the respective profession and bring additional identificational strength. Thus, even for this approach, those tasked with elaborating the code should pay very close attention to the values, attitudes and objectives of the stakeholders involved in the development of algorithms for socially relevant processes. This takes time and requires personnel resources. Consequently, to achieve maximum authenticity and credibility – as already mentioned under Criterion 2, leading to Criterion 9 – the development and formulation of the code should be moderated and structured by ethicists.

## 7.9 Scientific reflection

Scientific reflection also plays an important role in such processes, both at the time of preparation and in the actual elaboration phase, as well as in the period afterwards. For this workup to be a criterion for success, its protagonists must first of all strive to ensure high scientific standards with regard to the specific professional ethical challenges,and must also take seriously the question of how a professional ethics is constituted in order to gain acceptance among the practitioners. If, in the course of these efforts, theses are put forward that are recognized by the scientific community and which in turn influence from the so-called bottom up the more abstract moral-philosophical debate, this would certainly contribute to promoting the general public awareness of their own professional ethics.

In a context of machine-learning algorithms and deep neural networks, the methods and systems of ethics itself are changing. It is no longer possible to determine relations of accountability when the AI becomes a black box. Consequently, the transparency ideal is already rejected by some scientists as inadequate for an ethics of algorithms (see Ananny and Crawford 2017), while others are vigorously pursuing the question of how transparency – possibly on a different level of abstraction – can also be brought about in those systems that are hitherto opaque. Regardless of the fact that the GDPR demands a certain degree of transparency for algorithmic decision-making processes, it is precisely this dialogue between theory and practice that will ultimately determine whether a code of ethics for algorithms is accepted by practitioners or ignored because it is not sufficiently close to reality, or whether it will possibly even provoke defensive reactions (e.g., in the form of cynicism: see commentary on “Termaximus” in Wikipedia history, Wikipedia 2009).

## 7.10 Long-term commitment

The final criterion for success is long-term commitment. Indeed, many of the aspects mentioned above apply or fail to apply to one or the other professional ethics, without this being a question of merit or negligence. Nevertheless, it is evident that a long-term effort in the advancement and – as a consequence – recognition of a professional ethics is likely to bear fruit. As long as interest is sustained – even when success comes slowly – much can be optimized in the interaction between the various factors.

It is only natural that specific environmental factors as well as social values change over time. This is especially visible in the ongoing debate about the need for an ethics of algorithms. It would thus be presumptuous to assume that it is possible to resolve the moral questions that arise in this context through a single feat. The group of people involved in designing socially relevant algorithmic processes is far too heterogeneous for this to be the case. In our view – and we hope that this has been made clear by the current text – an exclusive positioning of an ethics for algorithms in the field of technical analysts and developers therefore runs the risk of over-simplifying the complexity inherent in the modeling of algorithmic processes (see Criterion 4). Precisely because algorithmization affects almost all occupations, the codes for all professions would actually require appropriate “boring out,” entailing a commitment that is both extremely long-term and interdisciplinary.

For this reason, it seems to us to be quicker and more productive to initially integrate the topics of data ethics and ethics for algorithms into companies’ self-regulatory codes. It is precisely against this background that more and more companies that are willing to assume responsibility are in the process of revising their codes. Crucially, this approach, which is currently undergoing further concretization under the heading of Corporate Digital Responsibility (CDR), holds all employees accountable and not just the (often external or freelance) “vicarious agents” who have yet to be found.

## Ten success factors for a code of professional ethics – the takeaways for algorithm design

| Factors contributing to the success of an effective code of professional ethics | To dos for the field of algorithm design |
|---|---|
| **#1 Historical tradition**<br>Professional ethic is rooted in a tradition that reaches across generations | Expose the normative tradition and ethical roots of algorithm design. |
| **#2 Personal interest**<br>Members are intrinsically motivated and are aware of social and ethical issues | Support existing initiatives targeting responsible approaches in the design of algorithms and participate in formulating guidelines. |
| **#3 Situatedness**<br>Professional ethics are acknowledged both within and beyond the profession itself and are the subject of discussion | Promote awareness of "algorithmic thinking" and of algorithmic design's ethical consequences for society through digital education and discussion within the field. |
| **#4 Group homogeneity**<br>Homogeneity of the professional group, individuals show a high level of identification with the group | Develop ethical principles in constructive dialog with all relevant stakeholders. Formulate principles as specifically as possible, as general as necessary. |
| **#5 Awareness through professional training**<br>Addressing moral philosophical challenges and making a sense of "we" a part of training | Establish linkages between established ethical codes from related professions. |
| **#6 Institutionalization**<br>Leverage professional associations in securing and establishing code of professional ethics | Promote professionalization by delimiting field of profession. |
| **#7 Sanctions**<br>Professional disqualification, fines or public reprimand that encourage compliance | Create "stop signs" and incentive systems<br>Promote debate on the ethics of creation of value and data use. |
| **#8 Material context**<br>Use of (financial) resources for formulating and updating a code of professional ethics | Enough resources should be provided to ensure that all stakeholders are included in the process of developing guidelines. Draw on external experts to steer and structure the process. |
| **#9 Scientific reflection**<br>Challenges in professional ethics should be made a subject of academic inquiry | Ethicists as theoreticians and developers as practitioners should exchange their knowledge and experience. |
| **#10 Long-term commitment**<br>Ongoing efforts to develop code of professional ethics further and promote their acceptance | Sustainable and interdisciplinary commitment to professional ethics issues. In the long run, adapt all professional codices affected by digitization and datafication to both. |

# 8 Summary

Those involved in designing algorithms currently face a field of activity that is undergoing considerable change. Indeed, one cannot speak of a uniform professional identity. However, both the algorithms created and the activities associated with them are the objects of critical observation in society. Even those who develop algorithms have themselves recognized the responsibility they bear. This contribution is driven by the recognition that while it makes sense to think about ethical standards for the field, we face a situation in which there is no clearly delineated profession per se and there is no set of ethical standards that have been established.

We therefore begin with the basics and seek to contribute to the development of a professional ethics in the field of algorithm design by identifying the factors that have contributed to the success of a professional ethics in other areas. These factors can then be transferred to the field of algorithm design. The goal is to develop a foundation upon which a purposeful discussion about a future ethics of algorithms can take place.

In this study, we have first explored the ethical codes of several professions and their actual success in regulating behavior. Building on this, we have identified those factors which, for formal and substantive reasons, could be applied to the field of algorithm design. The fields of medicine, social work, journalism, PR and marketing, advertising and engineering have been examined here.

### Findings and conclusions

Analyzing professional ethics in terms of their background, genesis and bindingness has resulted in ten criteria for good, that is, operational and successful ethics. These criteria can be transferred to the field of algorithm design:

1. *Historical tradition:* A professional ethos that grows from generation to generation, adapting over time as it deals with changing requirements and sharpens its focus, is a clear advantage in raising awareness of and promoting acceptance of a professional ethics.
   Since there is uncertainty in the public debate as to what algorithms actually are, a key task could begin with exposing the roots of algorithms, shedding light on the ethos of those who first created algorithms, and tracking the impact of algorithms on our present-day situation.
2. *Personal interest:* In professional ethics, the question of personal motivation is of crucial relevance. A professional ethics is more likely to have impact when the members of a profession share an awareness of the ethical consequences of their work in society and are personally committed to meeting these standards.
   Several initiatives have pointed out that a growing number of developers are addressing (or at least want to address) the consequences of their work, as they are very much aware of the impact of their activities. It thus seems likely that the concerns voiced by AI experts, with support, will result in an established code of ethics. A first step in the right direction could involve issuing a few guiding principles or a (broadly) generalized mission statement.
3. *Situatedness:* This criterion involves the visibility of a professional ethics – that is, the extent to which it plays a role in society, whether its composition is a matter of debate among those within the profession and so on. A single ethics codex can form the basis of this kind of tangibility, as can a series of visionary documents or even an oral tradition.
   In order to achieve situatedness – or a “Sitz im Leben” for an algorithm ethics, we must build on the existing socio-ethical consciousness of society and algorithmists as well as the broader understanding of “algorithmic thought” (see Chapter 5.1) and develop both through digital education and by promoting discussion within the field.

4. *Group character:* A professional ethics that emerges organically from a specific occupation will facilitate identification with the group and the maintenance of expressed values irrespective of whether group homogeneity was present from the start or is the product of a guided process. At present, those who work in the field of algorithm design are not a homogenous group, which is in part due to the dialogic nature of relationships between clients (management, departments), intermediaries (Demand IT) and contractors (Supply IT), but also to aspects of user behavior and the ways in which colleagues within and beyond an organization interact.
5. *Professional training:* Another key factor is professional training – in particular the deliberate exploration of one's own job description and the cultivation of a conscious self-understanding, both of which are drawn upon when establishing moral standards as a core competency within a profession.
   In order to implement professional training of this nature or develop the curriculum for training algorithmists, the profession must itself be more clearly delineated from other closely related professions – in particular information technology and (software) engineering –, a task which should not be underestimated.
6. *Institutionalization:* It is easier for professional groups featuring a high degree of institutionalization to enforce their ethics codes. However, when the interests of a single professional group are represented by several smaller associations, there is less of an incentive for individuals to adhere to the collective's moral guidelines.
   Successful institutionalization is also important if the ethical guidelines for socially relevant algorithmic processes are to be truly effective. But the profession of algorithm development has yet to be institutionalized and given the aforementioned issues regarding definitional boundaries, it remains open whether this kind of institutionalization is realistic or even desirable.
7. *Sanctions*: Given the relatively ineffectual impact of normative approaches that rely on the moral idealism of an individual, a professional ethics should therefore employ sanctions as stop signs, and/or an incentive system that points the way toward a high moral standard.
   Although the GDPR serves to enforce minimum compliance with ethical values and heavy fines can already be issued for violations thereof, it is no substitute for the ethical discussion on the creation of value through the use of data. Corporate digital responsibility could fill this gap and create a competitive advantage for the field.
8. *Material context:* The monetary context in which a professional ethics is developed and/or maintained is a banal but potent factor.
   Because developing a sense of identification with a professional ethics requires intensive dialogue with those affected, it is important to include as many stakeholders as possible in the process. However, inclusive, bottom-up approaches demand more resources. For this reason, and in order to achieve a maximum of authenticity and credibility, inclusive processes should be organized and managed by external experts.
9. *Scientific reflection*: If a professional ethics succeeds in securing acceptance among practitioners and, thanks to its high scientific standard, proves able to influence academic discussion, this will contribute to promoting general public awareness of the codex itself.
   In a context of machine-learning algorithms and deep neural networks, the methods and systems of ethics itself are changing. In order to avoid developing a code that is far removed from reality and thus either rejected or ignored, a strong dialogue between theory and practice is recommended.
10. *Long-term commitment:* Several of the criteria identified here do not apply equally to every professional ethic. As long as interest in the process is sustained – even when success comes slowly – there is considerable opportunity to optimize many things through the interplay of various factors.

> It would thus be presumptuous to assume that the moral questions arising in the context of algorithmic ethics can be resolved in a single stroke. Precisely because algorithmization affects almost all occupations, the codes for all professions would actually need to be adapted to address the dynamics of digitization and "datafication." This requires a commitment that is both extremely long-term and interdisciplinary. Companies and firms can make a significant contribution in this regard by pursuing *Corporate Digital Responsibility* (CDR).

Drawing on our thesis that the analysis of established professional ethics can yield insight into the (further) development of an algorithm ethics, these ten criteria can help guide such considerations. The identified criteria can be reached – some more easily than others – and can influence design and development processes in a variety of ways. At the same time, they are also complex enough to be able to meet the specific challenges of different professional areas. With respect to an ethics of algorithms in particular, the first step involves discussing whether defining a professional group – which is a prerequisite to establishing a code of professional ethics – is possible, practical, or even desirable.

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**Christopher Koska** studied information and media technology at the Brandenburg University of Technology Cottbus and philosophy and computer science at the Technische Universität Berlin. After completing his MA in philosophy at the Munich School of Philosophy, he conceptualized a project and process modeling software at Naviget GmbH. From 2013 to 2017, he was a research assistant in the Department of Media Ethics at the Munich School of Philosophy.

His research focuses on the fine line between data protection and context-aware recommendation technology, semantic mashups, educational issues, as well as data and algorithm ethics. Christopher Koska is a partner at the consulting firm dimension 2 philosophy and economics consult GmbH. He also advises digitization projects and manages IT projects on a freelance basis. In addition, he is active as vice chair of pro philosophia and as an independent research associate for the Zentrum für Ethik der Medien und der digitalen Gesellschaft (zem::dg).

**Claudia Paganini** studied philosophy and theology in Innsbruck and Vienna. After completing her PhD in cultural philosophy (2005), she focused on media ethics for her Habilitation. For her post-doctoral research, she sought to construct a core inventory of basic values by drawing on the self-regulatory codes of a diverse set of professional ethics. Her research also addresses medical, animal and environmental ethics.

Claudia Paganini is a member of the Medical University of Innsbruck's Ethics Commission and the Animal Testing Commission under the auspices of the Austrian Federal Ministry of Education, Science and Research in Vienna. She has also been active in interdisciplinary education and helped initiate the introduction of an ethics module for medical professionals in Innsbruck.

**Alexander Filipović** is a Munich-based communications and media ethicist and chairs the Department of Media Ethics at the Munich School of Philosophy. Following his studies in Catholic theology, communications and German, he completed his PhD on media ethics in 2006 at the University of Bamberg. In his research, he focuses on journalism ethics, television entertainment and digitization. In his lectures and publications, he addresses the changes and challenges to media that have been ushered in by digital transformation processes.

He coordinates the German-based Media Ethics Network (www.netzwerk-medienethik.de), authors a blog (www.unbeliebigkeitsraum.de), is co-editor of the media ethics publication Communicatio Socialis (www.communicatio-socialis.de) and chairs the Ethics Commission of the German Communication Association (DGPuK). In addition to media ethics, Alexander Filipović conducts research on philosophical pragmatism. Together with Klaus-Dieter Altmeppen, he also serves as co-director of the Zentrum für Ethik der Medien und der digitalen Gesellschaft (zem::dg).

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