# Modelling Between Digital and Humanities

## and

## Humanities

### Thinking in Practice

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# 0. Introduction

## 0.1 Aims and Context

This book describes the results of the authors' combined efforts over the last years to clarify and better understand the use and role of models in humanities research supported by computational methods – part of the field currently known as "digital humanities". Digital Humanities (DH) is an area of research engaged in exploring how humanities scholarship is transformed and extended by the digital and vice versa. This mutual transformation and extension concern tools (technology) as well as epistemologies (how we come to know). One of the core practices of DH research is indeed modelling (McCarty 2005, pp. 20-72; Buzzetti 2002; Flanders and Jannidis 2015, 2018), which implies the translation of objects of study and concepts into models to be manipulated (processed) computationally. The context of the research presented here was the project "Modelling Between Digital and Humanities: Thinking in Practice", which was funded by the Volkswagen Foundation from 2016 to 2018,[1] with the authors of this book as principal investigators.

The project idea grew out of a combination of design, computer-assisted research, and theoretical studies. Integration and connections of these activities and associated domains has been a long-term interest and aspiration of the authors, as seen for example in the effort to compare schemas for encoded texts produced in scholarly editing with abstract representations of database structures created for cultural

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[1]  The project was funded as Application A115838 to the funding programme "'Original – isn't it?' New Options for the Humanities and Cultural Studies", Funding Line 2 "Constellations" (2016–2017).

heritage documentation systems in ontology development (Ciula and Eide 2014).[2]

Identifying that overlap was the first step in recognising that an exchange exists across those modelling efforts and the resulting models which required further investigation. In line with critical approaches in the DH tradition, our aim is to build on the productive tension between digital methods and humanities research opened by modelling activities. Our research looks beyond the distinction between digital and humanities towards integrated methods and findings. This book, and the project it emerged from, are about modelling in the integrated space of digital and the humanities.

tension

shifting ground

**modeling between**

shifting ground

**Digital**
formal, rule-based, structured, discrete

**Humanities**
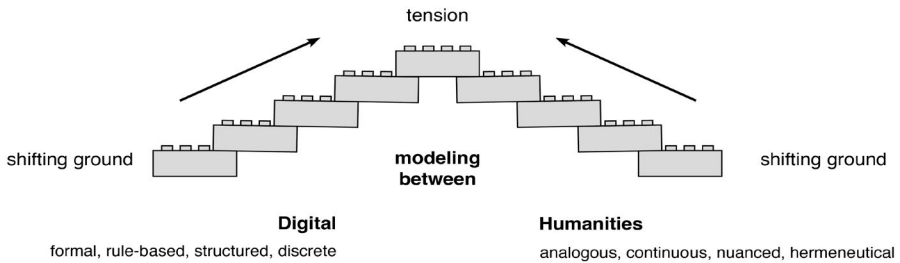analogous, continuous, nuanced, hermeneutical

Fig. 0.1 Metaphorical illustration of one of the aspects of modelling between digital and humanities: the tension across modes and methods of research presented as a LEGO bridge.[3]

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2    In Ciula and Eide (2014) we explored the conceptual and historical connections as well as the divergences between documents encoded based on the Text Encoding Initiative (TEI) standard and factual/hypothetical information in CIDOC-CRM based databases. Both types of data are relevant for humanities research and are digital – they belong to the digital as well as to the humanities, but emerged from different contexts, have different technical characteristics and fulfil different purposes.

3    An overview of the project and its outcomes, including a bibliography, is still accessible on a static site at http://modellingdh.eu/. A description of the implementation, including rationale and some main accomplishments, can be found in Ciula et al. (2018, pp. 11–16). A key milestone of the project was the interdisciplinary workshop "Thinking in practice", held at Wahn Manor House in Cologne on January 19–20, 2017. The proceedings were published in Historical Social Research Supplement, 31 (Ciula et al. 2018) and offer the basis for further reflections thematised also in this book (see for example Chapter 1, Section 1.3). The project proposal is available from this web page: http://modellingdh. eu/index.php/resources-2/material/. Research associates in the project were: Christopher Pak (King's Digital Lab, King's College London, UK, October

The project was based on the assumption that DH modelling is a creative process of reasoning, in which meaning is made and negotiated through the creation and manipulation of external representations. The ambition of model-based research in DH is making scholarly arguments practical via the creation and manipulation of digital models. Making external representations to reason has been part of the scholarly Western tradition at least since the Enlightenment; DH extends this practice by actively creating digital artefacts in different media. Through the lenses of critical humanities traditions and interdisciplinary takes on making and using models, the project had the ambition to reflect on the novelty of DH research: making explicit and integrating existing diverse models of cultural phenomena (e.g. texts; events). DH research was therefore a playfield for the authors and project team to: (i) explore possibilities for a new interdisciplinary language of modelling spanning the humanities, cultural studies, and sciences; (ii) analyse modelling in scholarship as a process of signification; (iii) develop connections between modelling as research and learning strategies.

An additional premise to further clarify the aims and context of this book is that what we would call "models" can be experienced in a number of quite different settings (Sahle 2018). As the title itself indicates, this book favours a specific view on modelling, emerging from the authors' work on modelling in a scholarly context. The explorative project has been an opportunity to develop this view further as a research group, negotiating and integrating different perspectives and experiences. This book is also about "thinking in practice" as it investigates modelling intended in a practical sense: creating, using, manipulating, deforming, and playing with models. This practical modelling is also a form of thinking: the practice of thinking-while-doing, or even thinking-in-doing. The theory of modelling foregrounded in this book is based on practical modelling work, yet the practical modelling work is in turn influenced by theoretical

considerations in a constant movement between the practical and the theoretical, i.e., of thinking and doing jointly.

"Modelling between Digital and Humanities" presupposes a certain tension. When the digital is discussed in the context of the humanities, formalisation and operationalisation, and sometimes "algorithmic thinking", are concepts used to understand and explain what takes place. The ability to abstract is considered a common aspect across these concepts, which pushes modelling into a primary position in the development of scientific and scholarly thinking and practice. Even within this specific perspective on modelling, formalisation can be used for two different yet connected purposes. First, formalisation is needed in order to make computers operate on the sources or objects of study for the humanities. This is known as data and process modelling, necessary for building computer systems and for the population of such systems with data. And second, when this formalisation takes place, new objects (models) are created and the objects or processes being formalised themselves change.

The change is complex but it follows certain patterns in relation to context, reduction of variation, and structural simplifications. In these processes of modelling for operationalisation, the change of the sources (loss of variation, gain of processability) thus enables formal processing and at the same time highlights what cannot (within the limitations of specific processing methods) be formalised and thus is left behind. This affordance of digital to humanities thinking, with its risks and limitations, is the topic of this book.

## 0.2 Building on the State of the Art

In the twentieth century, modelling as an explicit term grew in significance in the sciences, not the least in empirical work. Moreover, the introduction of computing machinery enabled simulation to grow in importance as an alternative path to exploring relationships and patterns in observational settings, complementing experiments and theoretical speculation. At the same time, modelling as an explicit

methodology became an inherent part of computer science as the field gained momentum. Much of the early work in the then so called "humanities computing" used modelling in similarly development-oriented contexts. After 2000, a growing interest in modelling, beyond application in the techno-sciences, became visible, most noteworthy in McCarty's seminar chapter on modelling in his 2005 book *Humanities Computing*. Here the concept of modelling, found in multiple areas of scholarship, supplemented the practice-based use of the concept imported from computer science. McCarty's argument included a link back to the period in which modelling was a central topic of discussion in social and cultural anthropology, roughly from the 1950s to the 1970s, recalling for example Geertz's[4] distinction between *model of* and *model for*.

The expansion of the concept of modelling in anthropology was also connected to the development of models in economics.[5] This link to economic modelling, rational actors, and game theory is also central to Stachowiak's seminal *Allgemeine Modelltheorie* from 1973.

The critical view on modelling developing in DH in the early 2000s reached out beyond the traditions from computer science into the humanities at large, as well as to the sciences. With the "new spring" of research into the history of the humanities[6] an important foundation to connect modelling in DH to the history of the humanities was laid. The first chapters of this book point further towards the terminological exploration of the concept of modelling in the longer history of human thinking.

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4   This specific example is taken from McCarty (2005, p. 27) and refers to Geertz (1973, pp. 93–94).

5   Frederic Barth, who was central to the development of modelling in anthropology in the 1950s and '60s, was influential in several disciplines including economics (Barth 2007) and wrote two books based on research and lecture series at the London School of Economics (Barth 1953, 1966).

6   See publications and activities of the Society for the History of the Humanities: https://www.historyofhumanities.org/.
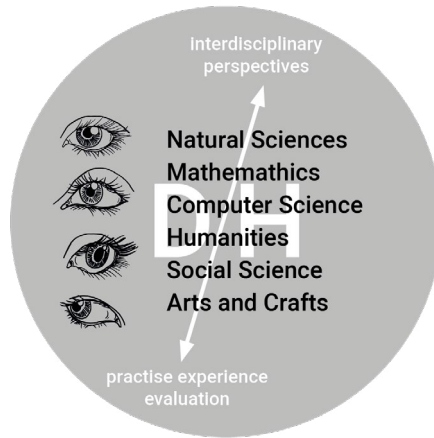
Fig. 0.2 The Digital Humanities not only benefit from interdisciplinary perspectives
to conceptualise modelling but also employ them to create models that work.

The project and this book also present a further perspective on modelling
in DH grounded in the concept of iconicity as it is known in Peircean
semiotics, building on more general proposals by Knuuttilla (2010) and
Kralemann and Lattman (2013), and connected to the specific view
on models as media products. Examples in the book emphasise how
modelling and visual thinking can be used as explicit tools to capture
the complexity of typical targets of modelling for the humanities, for
example: what a text really is. Chapter 5, in particular, engages with
this question by re-presenting (quoting) and sometimes representing
(by remediating) diagrams or other visuals associated with the
definition and modelling of texts offering an anthology that includes a
heterogenous range of glosses about what (a) text is, e.g.:

- Pre-theoretic category denoting a verbal expression; an act of
  communication; a sequence of language signs, a type or mode
  of media;

- (Re-)presentational layers in the scale of textual representation
  mostly given as media products, but sometimes codified as
  data that may be considered ontologically different from the
  documents the data is derived from and from those media
  products that are generated from the data;

- Operator object that connects a sender to receivers on many levels;

- Dynamic cultural object/s (material documents as well as conceptual objects) contingent on the contexts of their production and reading or fruition, expressed in a wide range of manifestations from linear to discontinuous narrative, from manuscripts to printed editions, from analogue codes to digital re-coding, encompassing hybrid modalities;

- Texts are constructed through models of text and perceived through models of understanding;

- Texts represent knowledge and can be the basis for knowledge processing (e.g. in DH); in stylistic terms, texts can be described by their similarity to each other; they are meant to convey information which can be extracted and represented as a set of assertions (like in RDF triples) or values (like in key-value pairs in an entity relationship model).

## 0.3 Terminology

The research behind the book dedicated particular attention to the terminology around modelling, starting from a discussion of possible definitions of the term 'model' and the verb 'to model', and continued with the unpacking of the use of some key terms attempting a sort of re-semantisation of the concept, building on other work in the project (Geißler and Tardella 2018).

Indeed, models and modelling could be referred to as what in mathematics are called "undefined terms", i.e. things that "can't be explained using more fundamental concepts, but have explicable uses and meanings" (Elkins and Fiorentini 2021, p. 5). To add to this challenge, as will be discussed in Chapter 1, any discussion on modelling – given the breadth of its possible applications and its porosity in relation to many fields of scholarship – has to tackle the problem of interdisciplinarity and the opportunities and weaknesses of polysemy which has developed over the history of use of the terms.

What follows below (Subsection 0.3.1) is a list of key terms extracted from the book chapters. The entries, in alphabetical order, offer the

readers some reference to the intended scope of the terms while still including their polysemy.

The selection of terms was guided by the claim made in Chapter 1 that a language can be developed around modelling in DH via mapping of relevant uses in the humanities and cognate disciplines. This process also aims at establishing the language anew, taking inspiration from the history of the concept and its intrinsic polysemy. Needless to say, many terms and concepts that would be relevant to enrich this landscape are not dealt with in this book. Examples include the study and approaches around mental modelling, and prototyping and meta-modelling. When relevant, references to the literature on modelling in areas such as the philosophy and history of science were used to encourage comparisons and reflections.

This list of keywords acts as a conceptual map, a sort of terminological guide to the book. The proposed definitions are borrowed from other fields but related to DH when appropriate. Ontological and epistemological aspects of the concepts in the list of terms are mixed. This interrelation is central to the discussion of what modelling means and is thus a basis for the book as a whole. The aim is to illustrate how the building blocks of the ontology of models and modelling are mainly analytical devices with an epistemological and pragmatic function. It will be up to the readers to find their ways across these terms while juggling the complexity of the conceptual field under examination.

## 0.3.1 Key Terms

**Affordance/s**: 1. Fundamental properties of a thing that determine how it could be used. 2. Aspects of the models (in particular its modalities and modes) that can support or restrict how models are actionable.

**Digital Humanities** (**DH**): 1. Field of research engaged in exploring how humanities scholarship is transformed and extended by the digital and *vice versa*. 2. Applied computer science in humanities research; development and practical application of computational tools for supporting research and teaching in the humanities.

**Iconicity:** Resemblance, similarity or analogy between the form of a sign (*representamen*, source) and its object (target).

**Icon/s:** Signs whereby the dominant relation with the objects they represent is one of similarity; the relation of similarity is enacted (1) via simple qualities of their own in case of images; (2) via analogous relations between parts and whole and among parts in the case of diagrams; (3) via parallelism of qualities with something else in the case of metaphors.

**Language, Metaphoric:** Recurring conceptual scheme in structuring knowledge.

**Media product:** Mediated expressions working as cognitive transport device used in communication between producing and perceiving human minds.

**Media representation:** 1. A media transformation that takes place when one media product is represented in another medium. 2. Expression of something with a media product that has been conceptual before (like a mental model); also called "mediation".

**Meta-modelling:** 1. Combination and integration of different models or perspectives of analysis of models, contingent on the modeller's languages and theories. 2. Accounts for the integration of practices of 'analogue' modelling with practices of modelling oriented towards a digital implementation. 3. In computer science, meta-models refer to abstract formalisms which include rules to generate other modelling languages. They are often referred to as schema languages or meta-languages.

**Metaphor/s:** 1. Carriers and creators of meaning; they define their own semantic fields, which have the potential to expand across related domains. 2. Cognitive tools which help their users and creators understand, interpret and express their world, theories, knowledge and findings; they enable them to grasp the unknown via what is known, both by making implicit knowledge explicit and by leveraging unexpected connections with other semantic domains. 3. Models of knowledge; they define what knowledge is as well as the scheme within which knowledge, conceptual systems and specific concepts operate; they play a fundamental role in structuring and modelling our conceptual systems; they lead narratives (e.g. around a project language) and reshape their contexts of production and use. 4. Meta-models generate other models. 5. → **Metaphor, Conceptual**. 6. → **7. Language, Metaphoric**.

**Metaphor, Conceptual:** 1. Meaning from one knowledge domain to another; they perform conceptual integration by mapping a source domain onto a target domain. 2. Condensation of complex ideas in simple terms; frequently used to understand how scholarly theories, models, objects, and knowledge emerge as a result of embodied physical and social experiences.

**Modality/ies (media modalities):** 1. Building blocks of media products (mediated expressions). 2. A set of four analytical categories (material, sensorial, spatiotemporal and semiotic) used to understand media products. 3. Include a number of possible modes.

**Mode/s:** 1. A way to be or to do things. 2. Building blocks of media products (mediated expressions) and their modalities (e.g. important modes characterising material modality are 'demarcated materiality' such as human bodies, and 'not demarcated' materiality such as smell).

**Model/s:** 1. Object/s aiming at channelling knowledge of something else by means of different forms of representation (i.e. notes, diagrams, images, tridimensional objects). 2. Key role player in reasoning processes (both formal modes of reasoning and representation, pertaining to deductive scientific methods, and less formal ones, mostly attributable to *analytical* research approaches) and knowledge development and sharing; model-based reasoning is a social problem-solving strategy grounded in everyday signification. 3. A heuristic tool (*lens*) by means of which an object is re-described as a result of a modelling process; provides a shareable language to talk about and understand (hence communicate) existing or possible realities. 4. An artefact, a concrete (visual, perceptible), shareable representation or expression embedding an element of theory, abstraction, a framework, or a sign; a media product used in modelling activity. 5. Objects mediated by the conditions and constraints of their perception and their language/s of expression; contingent, created in actual scholarly situations of production and use; partially arbitrary in that the same inferences drawn by manipulating one model could have been reached in other ways, for instance using a different model. 5a. **Factuality** of models refers to their form, their morphology and topology as well as their rule-based formality; the size, production process, language of expressions, materials, modalities, context of use of a model are part of its factuality. 5b. **Fictionality** of models refers to their subjectively determined dependency on prior

knowledge and theory, on interpretative visual and verbal languages, on the rules of the technical systems following which they are created and used. 5c. Factuality and fictionality of models are entangled and concur to determine their affordances. 6. Sign-functions initiate a sign-relation (**model-relation**) in the form of icons; the iconic relationship between the model and the objects or processes being modelled (target) is partly externally determined (it relies on the similarity between the model and the objects or processes) and partly internally determined (it depends on theory, languages, conventions, scholarly tradition, etc.); they are a type of sign mediating between the impressions of experience and freedom of association: 6a. **Image**-like models rely on and enable morphing reasoning, for example, real-life sketches where single qualities such as forms and shapes enable them to act as signs of the original objects they represent in given circumstances. 6b. **Relational or structural** models rely on and enable corresponding reasoning, for example, diagrams such as the relation exhibited in the graph of a mathematical equation. 6c. **Metaphor**-like models represent attributes of the original by a non-standard kind of parallelism with something else which generates further models; they rely on and enable metaphorical reasoning. 7. **Metaphoric model** 7a. An adaptable model working transversally at the experimental, theoretical and practical level. 7b. In → **Digital Humanities** (**DH**) a guiding metaphor that structures the digital artefact it originates at—at least—the three levels of data acquisition, data storage, and data presentation.

**Modeller/s:** 1. Modelling agent/s, subject/observer, those (e.g., researcher/s, designer/s) who create and use models. 2. In the semiotic perspective on modelling, the interpreter. 3. Machines/systems made by humans in the case of deep learning models and cycles of modelling activities where the human-machine interaction is highly entangled and where interpretability of all modelling steps might become secondary.

**Modelling:** 1. A process of signification and reasoning in action, a heuristic strategy of coming to know spanning multiple scientific cultures and epistemic traditions, where meaning is negotiated through the creation and manipulation of external representations combined with an imaginative use of languages with different levels of formalisation and modes of expression; a creative and highly pragmatic process in which metaphors assume a central role. 2. Context-dependent and

object-oriented dynamic process (the act of modelling) of selection of features (or salient qualities), motivated by the aims and the purposes of the modeller, to establish a partial mapping between the model and the object being modelled. 3. An activity where one or more modellers (human beings using various tools) use a media product (the model) as a means to: a) understand the targets of the modelling better (model of), and/or b) create new modelling targets, e.g. (model for): modelling = (modeller+, model (media product+), target+). 4. A process of *formalisation* in the sense of giving form, analysis, translation and interpretation, e.g. correlating (via models) facts and data or enacting a media transformation (as in the case in *critical stepwise formalisation*, where a media expression is studied through the process of adapting it into a new expression in another medium through a number of sequential steps). 5. A communicative act where models are shared and critiqued. 6. From a semiotic perspective, an open-ended process of signification (or meaning-making) enacting a triadic cooperation among object, *representamen* (form of a sign) and *interpreter* (significate outcome of a sign); a signification function which defines the relationships in the sign triple, where the object is the target, the representamen is the model or media product, and the interpreter is the modeller. 7. From an intermedia studies perspective, when the target of the model (a media product) is also a media product or a technical or qualified medium, modelling is a media transformation process, an act of translation between two media products or between a qualified medium and a media product, a process of establishing one media product based on aspects taken from either another media product or from a qualified medium. 8. In science and scholarship, modelling is a special case of modelling strategies humans adopt in everyday life; in this sense modelling is a research strategy intended as a process by which researchers make and manipulate external representations to make sense of objects and phenomena; this process is constrained and enhanced by the idiosyncratic contexts and purposes of research endeavours. [9]. One of the core practices of research in → **DH** and its earlier incarnation as humanities computing; translation of complex systems of knowledge into models to be manipulated (processed) computationally; translations and negotiations of meaning occur both in modelling processes engaged with abstraction of complex phenomena into rule-based procedures and in modelling directed

at the re-integration of the results of that abstraction or reduction into interpretative frameworks such as explanatory diagrams and data visualisations; a pragmatic activity framed within the complex cognitive, social, and cultural functioning of → **DH** practices affected by cross-linguistic and interdisciplinary dimensions.

**Modelling, Pragmatic:** 1. A process of thinking in practice anchored to theory but also rooted in the language in use, combining formal and experimental modelling techniques with a constructive use of verbal and visual languages; it unfolds in relational and dynamic cycles which are elicited via negotiations over the use of modelling languages (e.g. by narrowing and broadening categories of analysis, or borrowing categories from other disciplines); its pivot lies in the manipulability, negotiability and flexibility of models. [2]. A conceptual device to position the study of modelling in critical scholarship by privileging the specificity of the modellers, objects and the contexts of use, by recognising that modelling acts operate within relational and dynamic cycles which are elicited via negotiations over the use of modelling languages (e.g. by renaming categories of analysis or adopting neologisms); it strives to make the perspectives of study of modelling objects explicit, both in interpretative and technical terms; research and learning strategy that takes into account the complex intellectual, social, and cultural dimensions within which → **DH** operates.

**Operationalisation:** Process via which concepts of humanistic inquiry are operationalised, that is, made observable, measurable, formalised into rules (from algorithms to software systems and applications) hence creating empirical objects of study which bear theoretical consequences for the discipline to which they are applied.

**Source domain:** Conceptual domain from which metaphorical expressions are drawn to understand a target domain.

**Target/s:** Object/s or system/s being modelled; the objects being modelled in the humanities are usually, but not exclusively, cultural constructs (whether artefacts or concepts) made by humans; in → **DH** research, the privileged objects of modelling activities have been texts but they can include single objects of art or literature as well as large historical and cultural frameworks or concepts.

**Target domain:** Conceptual domain that we try to understand via the source domain.

**Transmediation**: 1. The result of a media transformation process. 2. A media transformation that denotes the creation of an impression in one media expression, the *target*, based on another expression in another medium, the *source.*[7]

# 0.4 Summary of Chapters

In the first chapter ("Towards a new language for modelling"), a selection of lexical ramifications and a semantic excursus on the terms model/modelling is proposed. Some etymological reflections on the terms and selected occurrences in the Western history of thought are mapped out. In addition, the concept of "pragmatic modelling" as it has evolved in our research project is introduced and contextualised.

In the second chapter ("Modelling and metaphoric reasoning"), the act of modelling is discussed. In particular, its representative and descriptive functions and how it operates within a context which includes a metaphorical language are considered. Metaphors adapt to, and at the same time transform, this language. The concept of pragmatic modelling is discussed further and is connected to how metaphorical language operates in DH as well as other (mainly interdisciplinary) modelling contexts. Furthermore, the chapter exemplifies how metaphors themselves are models of knowledge, as they define the schemes within which specific concepts operate and knowledge is established and expressed. In particular, in a DH context, the use of metaphors can have practical outcomes for how affordances influence data processing, storage, and design, and for how data are presented and interfaces are built. It is proposed to consider modelling as a creative and usually highly pragmatic process of thinking and reasoning in which metaphors assume a central role and where meaning is negotiated through the creation and manipulation of external representations combined with an imaginative use of formal and informal languages.

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7    Sahle (2010) has developed a different concept of 'transmediation', where the representation of a media object through model-based encoded information is considered to transcend the media qualities of particular media objects. Recoding towards a model-oriented abstraction in data that is not used as a communication medium but to generate media expressions is therefore called 'transmediation'. However, this notion of transmediation is not used in this book.

In contrast with the common theorisation of the practice of modelling in DH informed by the techno-sciences and computer science in particular, Chapter 3 ("Modelling as semiotic process") refers to model-making, theorised within a semiotic framework. Modelling is framed as a process of signification (semiotic process or meaning-making). This semiotic framework allows us to see modelling primarily as a strategy to make sense (signification) via practical thinking (creating and manipulating models). It enables us to stress the dynamic nature of models and modelling, and to reinstate in renewed terms the understanding of modelling as an open process of signification enacting a triadic cooperation (among object, *representamen* and interpreter). Referring to Charles Sanders Peirce's classification of hypoicons, we reflect on some DH examples of modelling in the form of images, diagrams and metaphors, claiming that a semiotic understanding of modelling could ultimately allow us to surpass the rigid duality object vs. model, as well as sign vs. context. In Chapter 4 ("Modelling as media transformation"), we dwell on the tangible physical forms of models as material and mediated media products expressed and shared in human communication. The forms models take are discussed in terms of configurations of media modalities. This intermedia studies approach, whereby modelling is studied as a media transformation process, complements the semiotic perspective of Chapter 3 by revisiting some of the previous examples and integrating them with a variety of heterogeneous models, from archaeology to theatre studies, and media transformation processes, including formalisations undertaken in DH research.

Chapter 5, the last chapter in the book, "Modelling text – A case study", presents a case study examining examples of activities of modelling around the concepts of text and textuality. This is a particularly rich case study as it spans various disciplines and illustrates different modes and functions of making implicit and explicit models, covering a broad range from theoretical descriptions to concrete applications in the realm of text technologies and knowledge representation. The authors' experience in practical modelling and theoretical studies on modelling contributed to a selection of examples. These aim to offer a "graphical" argument for how different models represent conceptualisations of and perspectives on texts in

different ways, illustrating key concepts discussed in the previous chapters, and opening up the discussion for readers to engage with the topic further. The argument takes a different form of expression from the other chapters by discussing models and their visualisations with the presentation of topical quotes extracted from the literature alongside their iconic counterparts, either in their original version or as interpreted visually by the authors and the designers. This effort is in itself an example of modelling as a translation process in action. In this chapter, models are exposed primarily as specific and situated visual representations that we experience when studying and modelling texts. They are presented according to a 'What You See is What You Get' approach, without accompanying extensive verbal explanations nor the discursive argument present in the other chapters. The chapter qualifies therefore as an anthology, a gallery, an empirical study, and an experiment on finding a different mode of argumentation to "change the launch pad" into future discussions around modelling.

## 0.5 Acknowledgements

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We take responsibility for any errors, omissions and flaws that readers may identify, and we welcome feedback to encourage new research.

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8    The report of the series of events organised within the lab activities is available online (Marras, Caligiuri 2018). On the workshops, see also https://modellingdh. uni-koeln.de/events.