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Legislating in hypertext[1]

Legislacja w hipertekście

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Abstrakt: Współczesne badania w zakresie stanowienia prawa w formie elektronicznej potwierdzają tezę, że teksty prawne udostępniane za pomocą różnego rodzaju systemów informacji prawnej tworzą strukturę hipertekstu. Z kolei badania nad hipertekstami wykazują, że zastosowanie tej technologii podważa strukturalistyczne teorie tekstu, które leżą u podstaw tradycyjnych zasad techniki legislacyjnej oraz dyrektyw wykładni prawa. W związku z tym w artykule omówiono sposób, w jaki hipertekst można wykorzystać do dostarczenia informacji prawnych. W szczególności poniższe rozważania koncentrują się na analizie zastosowania hipertekstu do przetwarzania dokumentów prawnych (w tym cyfrowej reprezentacji tekstów prawnych) oraz możliwościach, które pojawiają się w tym obszarze w związku z opracowaniem tzw. hipertekstów adaptacyjnych. Na tej podstawie podjęta została próba odpowiedzi na pytanie, w jakim zakresie i w jaki sposób można zastosować hipertekst adaptacyjny do prezentacji i analizy tekstów prawnych oraz czy zastosowanie tego rozwiązania może wpłynąć na tradycyjne praktyki prawne związane z opracowywaniem i interpretacją tekstów prawnych.

Słowa kluczowe: hipertekst, hipertekst adaptacyjny, ustawodawstwo, hipermedia, tekst prawny, przetwarzanie i prezentacja informacji

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Abstract: Modern research on lawmaking in electronic format confirms the thesis that legal texts made available by means of various types of legal information systems form a hypertext structure. Furthermore, research on hypertexts confirms that the use of this technology undermines the structuralist theories of text that underlie traditional methods of legislation and interpretation of law. In this article, an attempt is made to show how a hypertext can be used to provide legal information and how it can affect traditional legal practices connected with drafting and interpreting legal texts. In particular, the considerations will focus on the analysis of the use of hypertext for the processing of legal documents (including digital representation of legal texts) and the possibilities that arise in this area in connection with the development of the so-called adaptive hypertexts. On this ground the question is analyzed whether and, if so, to what extent and in what way an adaptive hypertext can be used for the presentation and analysis of legal texts.

Keywords: hypertext, adaptive hypertext, legislation, hypermedia, legal text, information processing and presentation

1. Introduction

Answering the question, to what extent an adaptive hypertext can be used in processing legislation, should take into consideration not only technical aspects of the issue, but also its cultural and, in particular, legal determinants. It is so because processing of legal texts in an electronic system requires both digitalization of legal information and virtualization of legal documents. Legal documents in an electronic format have to meet not only requirements arising from technical standards, developed methods and approaches for legal text processing – thus a possibility of implementation for real use. They have to meet also certain formal requirements, provided for in the law and some general requirements imposed on texts functioning in particular interpretative culture. After all texts are not random sets of linguistic expressions, but rather limited and coherent sequences of linguistic signs which, as a whole, are able to signal a recognizable communicative function.[2] Therefore, legal texts, as all other texts functioning in a particular culture, have to fulfil requirements of textuality. It is one of the reasons why texts visualized on users' screen usually mimic written or printed texts, including international standard paper sizes.[3] One has to be aware, however, that the requirements of textuality can determine both semantics, syntactics and pragmatics of legal texts. Hence, the principles of legal drafting functioning in a legal culture directly or indirectly incorporate these requirements and imply particular forms of their realization. It is so be-

[2] K. Brinker, *Linguistische Textanalyse. Eine Einführung in Grundbegriffe und Methoden*, Erich Schmitt, Berlin 1988, p. 17.

[3] ISO 216:2007, *Writing paper and certain classes of printed matter – Trimmed sizes – A and B series, and indication of machine direction*, International Organization for Standardization, https://www.iso.org/standard/36631.html, accessed: 15.04.2020.

cause compatibility between principles of legal drafting and the requirements of textuality condition to a great extent the effectiveness of communication of legal regulations. The problem is that information and communications technologies (ICT) change mechanisms of drafting and interpreting texts and thus disturb the traditional relationships between them functioning tacitly in the legal culture. It is worth reminding that architectural patterns (widely used in software engineering), which represent in practice high level structures of ICT systems,[4] are based, in particular, on separation from an application the level of information (data) processing and the level of visualization of output information (data). It opens a way to changing only a visualization layer (keeping the database unchanged) in relation to fixed criteria and possible external factors, time, used IT standards/protocols/interfaces, and also application of software used for reading a legal text (i.a. word processors, portable document format viewers, office suites based on cloud storage services) which may not have features to support certain functionalities (for example, footnotes or also text formatting). In addition, legal text presented for a user can be produced by extraction of consistent part, for example a block of text, from various resources (including heterogeneous and distributed ones), thus hyperlinks included may refer to not constant (in time) content and the recommended document structure. Moreover, the content and presented structure of a legal document may differ in relation to a used machine (desktop computer, mobile device, etc.).

All this means that implementation of official adaptive hypertexts into legal practice ultimately will require an alteration of traditional ways of drafting, disclosing and reading legal provisions. Please note that the notion of text in general, and legal text in particular, is commonly associated with the phenomenon of written communication, that is not only with the idea of executed speech, but also recorded and separated speech.[5] From this perspective, a text is a product of communicative action rather than interaction or interpretation.[6] This means, that a text is neither an accidental event taking place here and now nor a result of interpretation. In short, it is not necessarily interaction-oriented. The generally shared belief of lawyers is that text is a self-sufficient, semantically autonomous, continuous, linear and finite entity. Consequently, texts function in the legal culture as a ready-made product. Hypertexts in general and adaptive hypertexts in particular do not fit in this picture. Paradoxically, in many respects, they resemble oral texts a lot more than written or printed

[4] See more: I. Gorton, *Essential Software Architecture*, Springer, Springer, Berlin–Heidelberg 2011.

[5] A. Okopień-Sławińska, *Semantyka wypowiedzi poetyckiej*, Universitas, Kraków 2001, p. 16.

[6] D. Viehweger, *Zur semantischen Struktur der Texts*, in: F. Danes, D. Viehweger (Hrsg.), *Probleme der Textgrammatik II*. Studia grammatica XVIII. Akademieverlag, Berlin 1977, p. 107; S.J. Schmidt, *Texttheorie*, Fink, München 1973, p. 145 ff.

ones. It is so, because they are rather dynamic systems then static structures. Although in hypertexts the final information passed to the user is compatible with input requirements, assumed general scheme of information flow in the system and structure of presentation, such information has also a random component, which is dependent on features of a particular user (a person), hardware and software environment and the time in which the information is retrieved, processed, presented and read by the stakeholder.

Hypertexts are open. It means they do not have a definite beginning or end, they are structurally discontinuous, the information flow is not established, the final information that will reach the stakeholder is unknown. Structural discontinuity is especially visible in the case of adaptive hypertexts which combine the hypertext system with the concept of adaptive systems[7] (complex adaptive systems change their behavior in response to their environment[8]). It needs remembering, though, that while traditional hypertexts were still limited to providing the user with tools allowing free exploration of the information by browsing a complex network of texts nodes, the task of adaptive systems was to adapt the information to the user and provide them with relevant information,[9] dedicated and personalized (in relation to the registered user's experience) and also adapted to current information environment (data stored in databases and related attributes like timeliness, validity, usefulness, consistency and complexity).

2. A legal text in hypertext

Although there is some disagreement in legal theory what can count as the most basic element of a legal text, let us accept for the sake of our analysis that regardless of whether the most basic element of a legal text is a legal provision, or even a phrase not having the form of a legal provision, a legal text, as all other texts, are indeed hyper-sentences constructs.[10] From this perspective, the essence of legal texts is expressed in relations between units more complex than single legal provision. Although such relations may not have a formal character, they still determine interdependencies between practices of writing and reading legal texts. This is the main reason why they should be considered when an adaptive hypertext of legal documents is to be created. It must be noted that

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[7] See more in I. Mareels, J.W. Polderman, *Adaptive Systems. An Introduction*, Birkhäuser, Boston 1996.

[8] Y. Bar-Yam, *Concepts: Adaptive*, The New England Complex Systems Institute (NECSI), Cambridge, MA, http://necsi.edu, accessed: 15.04.2020.

[9] See more in P. Brusilovsky, *Methods and Techniques of Adaptive Hypermedia*, in: P. Brusilovski, A. Kobsa, J. Vassileva (eds) Adaptive Hypertext and Hypermedia, Springer, Dordrecht 1998, p. 1-43.

[10] I. Rosengren, *Texttheorie*, in: P. Althaus, H. Henne, H.-E. Wiegand (Hrsg.), Lexikon der germanistischen Linguistik, Niemeyer, Tübingen 1980, p. 275 ff.

these relations not only define the scope of a particular legal text, but also its composition, and thus help to delineate in it particular microstructures and their mutual interdependencies, which determine its normative meaning.

Even though the question of what constitutes a smallest part of a legal text is relevant for our considerations, one has to bear in mind that both in legal theory and in text linguistics much more attention is paid to the problem of the boundary of text. Without a doubt, any answer in this regard must be of particular importance to any theory of interpretation. After all, it will determine what counts as the object of interpretation, or to put in differently, where a particular text ends and another one begins. Unsurprisingly, answers to the question oscillate between two extremes. On the one side of the scale we have conceptions, influenced by structuralism, which define a text as a closed and finite structure, and on the other one – postmodernist ideas which tend to blur, or even obliterate the boundaries of text.[11] Between these extremes, as usual, there is the whole spectrum of theories attempting to reconcile a text's immanent potential to cross its borders with the postulate of its closed and finite character.[12] From the point of view of our considerations, it is important to see that digitalization and computerization of legal texts results in undermining the role of the text boundary. It is so because from the computer sciences' point of view, a text is nothing more but a string of characters, a string of symbols from an acceptable set of symbols, also called an alphabet, where each character is being written on a specified number of bits. It needs reminding that considering data processing in low-level of raw data processing (with machine code, bytecode, etc.), only a limited set of compact source codes (statements) can be used. Consequently, the legal text considered as an encoded set of characters of a fixed size can be reduced ultimately to strings of zeros and ones stored on a carrier (a digital data storage) in a file format, in a centralized or distributed way,[13] suitable for further data processing (reading, modification), with regard to ensuring its user availability in a real time and consistency. This fact makes us aware that the concept of text in general, and the concept of a legal text in particular are at least to some extent technology dependent, and certain text features are in fact determined by the medium which carries a text. And it is not just about that the medium is the message, as M. McLuhan claims,[14]

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[11] See S. Critchely, *The Ethics of Deconstruction: Derrida and Levinas.* Blackwell, Oxford and Cambridge, MA 1992, p. 38.

[12] W. Kalaga, *Mgławice dyskursu,* Universitas, Kraków 2001, p. 209 ff.

[13] See more A.S. Tanenbaum, M. van Steen, *Distributed Systems: Principles and Paradigms*, Create Space Independent Publishing Platform, 2nd edition, 2016.

[14] M. McLuhan, *The Medium is the Massage: An Inventory of Effects*, Gingko Press, Quentin Fiore 1967.

but that different media imply different ways in which the text is written and interpreted. Furthermore, a traditional text format allows the author to unilaterally organize the text content into specific hierarchic and horizontal structures strengthening its coherence. For example, we could mention text segmentation, elements structurally beginning or closing a text, such as title or conclusion, complex developments or references to preceding or subsequent elements, introductions, tables of content, indexes, division into paragraphs, parts, books, chapters, sections, etc. The same can be said about legal texts. Of course, the sequence or types of certain elements may vary, depending on the requirements of a specific legal system and legal culture in which they are generated. Nonetheless, traditional texts of statutory regulations have a number of significant similarities. Usually, they are divided into a non-articled and articled component. The first usually specifies the type of regulation, title, date of adoption or year, often a preamble and the number of the regulation. Additionally, in many cases we can distinguish a proclamation formula. The articled component is divided into parts, numbered and organized into articles, sections, points or letters. The entire text is usually systematized in a certain manner. Consequently, sets of rules are grouped into books, sections, titles, chapters, etc. In most cases, at the beginning of a regulation, there is a section containing legal definitions, followed by substantial, institutional and procedural provisions.[15] Characteristically, texts of statutory regulations lack metatextual operators, summaries, repetitions or commentaries immanently determining the comprehensibility, clarity or intentionality of typical linear texts. Additionally, legal texts are edited disregarding cause and effect, chronological or result consistency. Nonetheless, they are required to be consistent, materially and formally complete, general in character, and at the same time concise, synthetic, unequivocal and clear.[16]

The possibility to apply the above measures in the process of text production results both from the linear structure and mechanisms of composing written texts. Consequently, a written text is two or, at the most, three-dimensional, which makes it seem a static structure enabling synchronic analyses. It becomes, like it did for Isenberg, a specific, invariable sequence of sentences interlinked by text tools.[17] Furthermore, segmentation features of traditional texts enable to design and develop tools (applications software) with a relatively simple structure

[15] See more in W. Cyrul, Podstawowe zasady legislacyjne tworzenia statutów samorządu terytorialnego, in: W. Kisiel (ed.), Statuty jednostek samorządu terytorialnego. Regulacje europejskie i amerykańskie, Zakamycze, Kraków 2005 and the lit. cited there.

[16] See more in S. Wronkowska S., M. Zieliński, *Problemy i zasady redagowania tekstów prawnych*, URM, Warszawa 1993; P. Noll, *Gesetzgebungslehre*, Rowohlt, Reinbeck bei Hamburg 1973; H. Hill, Einführung in die Gesetzgebungslehre, Müller, Jurist. Verl., Heidelberg 1982.

[17] H. Isenberg, *Überlegungen zur Texttheorie*, ASG-Bericht No. 2, Berlin 1968, p. 4 ff.

(thus interface) for text presentation, finding of words, phrases and specified parts of final documents (sections, cites, equations, etc.). However, contrary to traditional texts, hypertext refers to the non-sequential and dynamic arrangement of text-based information.[18] Simplifying the problem a little, one can say that while the standard text is composed of a set of linearly related sentences, hypertexts assume the occurrence in a real time of many references (links) to various forms and explanatory sources, disturbing the linearity of the text. Moreover, the hypertext enables referencing to subparts (sections, blocks or other parts of documents specified in the legal document structure) of placed above or below an analyzed finite piece of the text.

Although there is a significant difference between the so-called constructive and explorative hypertexts,[19] in general, the hypertext is a system of interlinked nodes, i.e. arranged information appearing on the screen. It is worth noting, however, that an adaptive hypertext is a dynamic system, which at least potentially can support a user in creating, obtaining, applying and managing a set of interconnected information,[20] including also the possibility of changing information in a node. Thus, the specific character of the adaptive hypertext is determined not by the quality or quantity of information, but by the way it is arranged (for example, a number of nodes, references to the same content, a possibility of navigation within the same piece of text, frequency of links inserted). This is due to the fact that text coherence in the hypertext, other than in a linear text, is determined by the goal of the user and his/her choices (it is important to emphasize, that such user's choices may differ in time). A traditional text is consistent, only if its content is free of logical contradictions, and its structure has the right sequence. Contrary to a traditional text, the hypertext can include inconsistent information and still enable consistent ways of its reading. It is so, because in the hypertext, apart from the metalevel of the information management system, there exists *a priori* no necessary order allowing us to speak of its logical or sequential consistency. The hypertext is dynamic and oriented at interaction with recipients (stakeholders). Consequently, it tends to diffuse, fragment and converge with the context in which it is read. Moreover, the hypertext never appears as a whole to a user (by default). As a result, from the reader's perspective, consistency in the hypertext has to be secured on the

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[18] J. Janangelo, *Joseph Cornell and the Artistry of Composing Persuasive Hypertexts*, College Composition and Communication, Vol. 49, No. 1 (Feb 1998) p. 24.

[19] M. Joyce, *Of Two Minds: Hypertext Pedagogy and Poetics,* University of Michigan Press, 1996, p. 39 ff.

[20] We use the notion of information, since a hypertext may include not only texts, but also multimedia elements. See M.P. Bieber, S.O. Kimbrough, *On Generalizing the Concept of Hypertext*, MIS Quarterly Vol. 16, No. 1 (Mar., 1992) p. 77 ff.

level of particular nodes, but not necessarily between them. Thus, one can claim that a consistency level of the hypertext is at least partly affected by a random factor which influences choices of the user at a point in time.

The hypertext imposes also on a text completely different demands as to the requirement of coherence.[21] In the case of a traditional, linear text, coherence depends on the reader having the knowledge and experience assumed by the author and necessary to properly understand the text. If such knowledge is not explicitly expressed in the text itself, the text coherence will depend on the context in which it is read. Thus, traditional text coherence is conditional on the reader's vision assumed by the author (similarly as in the process of retrieving information from data by a person). Nonetheless, this does not contradict an active role the reader has in reconstructing the meaning of a text. In the hypertext, however, the role of the reader and the author undergoes a significant transformation. Basically, we deal here with the possibility of the reader's actual participation in text creation. As a result, whereas the coherence of a structurally written linear text forces the author to verbalize a message as fully as possible and to ensure the highest degree of its semantic self-sufficiency, achieving the same effect in the hypertext would additionally require the author to control the mechanisms of linking information and establishing or changing the rules of information division into coherent information nodes (in this approach, it is important to distinguish between the author of the original text and the author of the hyperlinked texts).

Text coherence, as a function of knowledge assumed by the author and the reader's knowledge, requires a hypertext author to control the links, i.e. to consistently link information on a given topic appearing in various nodes (also availability period and the possibility of creating a link to the same node in different ways). Thus, unless hypertext creators assume that each link constitutes a necessary means to read the text in the hypertext, it will be hard to speak of its coherence in the traditional meaning of the word. Given the lack of the author's control over the ways of interpreting information included in the hypertext, its coherence depends on the actual knowledge of users determining their choice of the way they read and, eventually, persons responsible for publishing texts as hypertexts in an electronic format (for example, on websites HTML documents).

From the point of view of the traditional text coherence theory, the hypertext should be assumed structurally incoherent. Yet, such incoherence of the hypertext does not contradict possible coherence within its respective frag-

[21] W. Cyrul, *Consistency and Coherence in the "Hypertext" of Law: A Textological Approach*, in: M. Araszkiewicz, J. Šavelka (eds), Coherence: Insights from Philosophy, Jurisprudence and Artificial Intelligence, Springer, Dordrecht 2013, p. 170 ff.

ments (strings of characters) or sets recorded in a linear form in a database. Even though the hypertext as a whole can be a closed system, its structure and functioning substantially prevent the reader from taking all its elements simultaneously into consideration. Consequently, as long as information in the hypertext is not generated and linked by a single entity or according to a certain principle anticipating the reader's choices, it is impossible to ensure coherence of all possible interpretations (thus an intertextuality), including relations and dependencies between information nodes thus mapping the intentionality of a traditional text to a hypertext. On the other hand, if, as it was suggested by Slatin, we take linkage of information for an equivalent of a linear text sequentiality, then a link may simulate a relation between the author's and the reader's mind.[22] Thus, coherent can be both an entire hypertext and each of its nodes. If information is not linked in anticipation of the way it is read, a hypertext, or rather a fragment of hypertext, may only be subject to systematizing and ordering by its users. The products of their operations, however, are not identical with the hypertext. What is more, coherent as they might be on their own, together they will not necessarily create a consistent whole.[23]

The hypertext changes the meaning of intertextuality, that is the relations of a text to other texts.[24] In traditional texts, intertextuality plays a role similar to that of a context, meaning that it determines the relations between a given text and other texts, which gives the text a specific meaning. An intertextual frame in which such a text functions and to which it can refer, reduces the ambiguity which would otherwise be caused by its full self-sufficiency and semantic explicitness. Consequently, a linear text requires of its reader not only knowledge of a language and the rules of its interpretation, but also of other texts to which a given text refers. In effect, it also assumes knowledge of certain generic rules and stylistic and utterance standards underlying specific texts.[25] As a rule, the hypertext does not make such assumptions. Its dynamic character and openness to the reader means that it is the reader who decides in what systems a given piece of information will function. As a result, the hypertext is immanently open, discontinuous and linguistically heterogeneous. The functioning of links, too, confirms the difference between intertextuality

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[22] J.M. Slatin, *Reading Hypertext: Order and Coherence in a New Medium*, College English, Vol 52, (Dec 1990,), p. 877.

[23] W. Cyrul, *Legal Drafting: From Text to Hypertext*, in: M. Pieniążek (ed.), The 23rd IVR Congress of Law and Legal Cultures in the 21st Century: Diversity and Unity, AFM Publishing House, Kraków, 2009, p. 14.

[24] W. Cyrul, *Consistency and Coherence…*, p. 178 ff.

[25] R. Nycz, *Tekstowy świat. Poststrukturalizm a wiedza o literaturze*, wydawnictwo IBL, Warszawa 1995, p. 62;

of a linear text and dynamic reference within a system of existing information nodes in the hypertext. In the case of a traditional text, intertextual relations are usually neither formalized nor obvious or necessary. It is only the hypertext which justifies the claim that a text can become a product enabling a vast number of different, equally proper ways of reading, and validates the statement that a text is created in the course of the reading process. Thus, the intertextual potential of a traditional text is practically represented and realized only via the electronic medium. In the hypertext, the text is no longer only an effect of its writing down, but it *de facto* becomes equally a result of the reading process. Traditional texts as such do not have this dynamic element. Consequently, a traditional text implies a sharp division between the author and the reader. In the hypertext, those roles are not so obvious, considering that the hypertext may in practice be co-created or co-developed by several entities, or even by a system itself.[26] Moreover, the system can automatically link respective hypertext fragments according to a user's requirements.[27] It needs noting that changes of such information can be made independently by different entities (both parallel and in series), linked fragments of a text may contain links to other fragments (multi-level references), and they may also return the reader to parent fragments (repetition of information nodes). On the other hand, algorithms dedicated to automatic linking of fragments of texts can be designed and implemented as deterministic, stochastic and also adaptive ones.

The status of a text depends also on meeting the intentionality requirement. In the case of intentional communication, the author and the reader always take deliberate measures to realize their goals which they want to achieve through communicating or receiving information. As far as a linear text is concerned, its efficiency in mediating the author's intentions depends both on the degree of complying with the textuality category and on the credibility of communication. In written and non-addressed texts, credibility of message is structurally guaranteed on the level of the assumed auditorium model. In written texts addressed to somebody, it depends on the relations between the author/communicator and the receiver.[28] The hypertext does not belong to the category of addressed texts and it is made for somebody rather than addressed to somebody. Nonetheless, as to the hypertext intentionality, it is hard to speak of an assumed model of auditorium or recipients. Moreover, it is hard to measure the

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[26] W. Cyrul, *Legal Drafting…,* p. 15.

[27] M.P. Bieber, S.O. Kimbrough, *On Generalizing...*, p. 82 ff..

[28] See more in E. Aronson, B.W. Golden, *The Effects of Relevant and Irrelevant Aspects of Communicator Credibility on Opinion Change*, Journal of Personality, 30/1962, p. 135-46; J.S. Kerrick, *The Effect of Relevant and Non-Relevant Sources on Attitude Change*, Journal of Social Psychology, 48/1958, p. 15-20; J.C. McCroskey, *A Summary of Experimental Research on the Effects of Evidence in Persuasive Communication*, Quarterly Journal of Speech, 55/1969, p. 169-176.

efficiency and justifiability of the performed division of text into information nodes and hard to determine, enforce and control a reading path associated with information flow. As it has already been mentioned, the hypertext disrupts the division into the author and the reader. Contrary to a written text, it usually allows the reader to actively participate in the process of generating text and enables the text to be read in a way not anticipated by the author.[29] Insofar as printed texts prevent interaction with readers, electronic texts give readers control and choice. Thus, as long as links and nodes creation in the hypertext is not supervised or planned by the author, it is hard to speak of the hypertext intentionality otherwise than as of an ability to effectively provide information required by the reader, with some additional facilities (for example, reducing time for information finding, avoiding reading uninteresting/undesirable fragments of text, choosing the order of reading, etc.).

Text intentionality as a condition of communicative character is closely related to the problem of text informativeness.[30] After all, traditional text effectiveness depends not only on whether it contains information necessary for proper understanding of a message, but also on whether it includes information which is new to the reader. A lack of new information, previously unknown to the reader can be discouraging, and thus often causes interruption of the reading process or omitting large parts of the available content. On the other hand, excess (redundancy) of information also reduces text readability, making it impossible for the recipient to comply with its original complexity. At this level there emerges a vast advantage the electronic medium holds over printed text: it provides tools to analyze long texts, allowing for their full complexity.[31] Indeed, the hypertext enables link management in a way that eliminates nodes irrelevant from the point of view of user-determined criteria and application of text retrieval engines or intelligent agents technologies.[32] Such tools, algorithms and applied computational paradigms can also duplicate nodes in order to predefine criteria or to modify the content (thus information) in relation to the profile of the user (classified features, system permissions, etc.), time, importance of information (a fragment of text) in relation to changes made by the author, considering user experience (UX[33]).

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[29] N.G. Patterson, *Hypertext and the Changing Role of Readers*, The English Journal, Vol. 90, No. 2, Technology and the English Class (Nov., 2000), p. 76.

[30] W. Cyrul, *Legal Drafting…*, p. 15.

[31] R. Susskind, *The Future of Law. Facing the Challenges of Information Technology*, Clarendon Press, Oxford 1996, p. 107 ff.

[32] W. Cyrul, *Legal Drafting…*, p. 16.

[33] M. Hassenzahl, *User Experience and Experience Design*, in: The Encyclopedia of Human-Computer Interaction, 2nd ed. The Interaction Design Foundation, www.interaction-design.org, accessed: 15.04.2020.

Hypertexts are, by definition, designed and used as a set of distributed nodes, with a referencing schema describing relations between fragments of texts. By default, they are presented digitally. But one should consider that in many situations users (readers) have a need to print a particular text or they want to use consistent fragments of the text (a set of nodes) for further purposes. Thus, in such cases the goal is to split input text into fragments in a way as to ensure the possibility of generating consistent documents (for example pdfs) from distributed fragments, properly formatted for obtaining output text (well-formatted, readable and understood by the user after printing). Thus, it indicates that dividing an original (input) text into a set of information nodes is not a trivial task. It should include also the requirements for merging selected parts of fragments of texts chosen (manually marked) by the user and specific rules of presentation (visualization) to meet the criteria of the text intentionality and contained information intended to be obtained.

3. Remarks on adaptive legal texts

The concept of adaptive hypertexts is related to an idea of adaptive systems and adaptive algorithms which relies on the assumption that such systems/algorithms adapt to the environment. Their parameters, structure, processing conditions and – finally – behavior can change in time. In particular, results presented (available) to the user can differ in relation to properties of input data (for example, a legal text, changes made, a number of references), external conditions (change of overriding provisions of law) and a user profile, related to his/her professional experience, the role, assigned tasks, permissions, etc.

The adaptive hypertext can play an important role in a legal text reading, understanding and drafting. The use of adaptive linking for law can result in supporting the process of ensuring the consistency of text and decreasing the level of its linguistic ambiguity. The adaptive hypertext for law would also ensure a feature enabling adaptation of a text to the user experience (UX, his/her behavior) which can be analyzed in a real time during the user's access to the document (the adaptive system can change behavior in relation to results of such analyses) and also, perhaps, other (related) documents or even other resources (for example, a simultaneous activity on team-management software, legal information system, data repositories, issue tracking systems, etc.). Moreover, it is possible to develop and use tools (application software, programming libraries, etc.) for monitoring efficiency of users' cognition (acquiring knowledge and understanding the available text) and the way they use the available hyperlinks, which can indicate important (crucial) links and inessential ones. Furthermore, adaptive hyperlinks can also be valuable for legislators, because they can encourage (motivate) users not to finish the reading before the final

important information node is reached. Such a requirement can be met by an on-line analysis of the number/frequency of activated links by the reader, time spent reading/analyzing a node, the difference between a typical user behavior during reading a text and the behavior registered for the text, and many other possible factors used as benchmarks for analyzing efficiency of the user cognition.

The idea of adaptive hyperlinks for legislation needs to establish formal rules for dividing a text into consistent parts (denoted as information nodes) and rules for generating hyperlinks. Such a process can be realized and controlled by the superuser (i.e. the author, expert) or, alternatively, by a machine in the case where all principles (rules) can be unambiguously determined or as an effect of applying self-learned software solutions. There are also possible mixed approaches/solutions, especially based on multi-level processes, where on the first level information nodes and/or hyperlinks are initially adapted, and on the second level, changes to be revealed to a user need to be accepted by an authorized agent. Formal rules should cover also validity (availability to the user) of links in text including dedicated areas in documents, where such links can be visible and output text formatting (visualization) in relation to the importance of information and the scope. Moreover, it is important to consider various forms of links descriptions which are presented to the user (for example, full description of the linked information node, short description, acronym, a message combining the analyzed and target text, short fragment of text presenting keywords, a level in the legal document structure, etc.).

Adaptive hyperlinks in a legal document being drafted may refer to one object (an information node), for example a paragraph, chapter or chunk of text, or a set of objects. In the second case, an object (information node) can be viewed as a text (content) generated dynamically during a linking process (e.g. a finite set of related/significant commentaries or provisions). In addition, adaptive hyperlinks can support legal drafting by indicating (referring) related nodes (to the processed text) requiring changes or consideration.

Dynamic links can be activated (visible) and deactivated, depending on environmental factors, especially in the case where a set of normative acts in force changes. This functionality may be usable for legislators to facilitate a legislative process. Further, adaptive links can be static (available in a specific part of the document, with constant features like referred text, font size, etc.) or dynamic (their properties can change in time). Changes of such hyperlinks can be viewed also as changes of the font size, color, family, case of letters and text (a message) describing a particular hyperlink. To generate such a description of a hyperlink one may consider the use of natural language generation techniques.[34]

[34] See more in Robert Dale, Ehud Reiter, *Building Natural Language Generation Systems*. Cambridge University Press, 2000.

Adaptive linking (referencing in the hypertext) concerns inserting hyperlinks in a document (with splitting into consistent parts) in a dynamic way. It means that such links (availability, position, features, status, etc.) can change in time to present up-to-date, relevant information in relation to, among others, the user's profile (to make available personalized information for a profiled person by features like: age, gender, education, profession, experience, etc.), external references structure (an ability to change based on interdependencies and entailment between documents contained in a dataset, including coreference resolution),[35] lifecycle phase of a document and referenced texts (consideration of temporality), physical, syntactic and semantic features of linked information nodes (size of documents, syntactic features, semantic intents, context, word sense disambiguation, etc.), text importance/weight (considering relevance of the document).

To understand and control the relation between information nodes (thus the legislation process) one may recommend the use of visualization techniques to generate hierarchical maps of hyperlinks able to visualize organized information, by analogy with other fields where relations between objects is relevant (i.e. database diagrams,[36] mind mapping,[37] tag/word clouds[38]). Such maps, by definition, may vary in time. They can adapt to changes of hyperlinks, information (content) and the user. In practice, generating of such adaptive maps can be supported, i.e. by the use of relationship extraction[39] and lexical semantics[40] methods.

4. Conclusion

The concept of use of hypertexts for legislation purposes is strongly connected with the need of changing the paradigm of legal text presentation and legal drafting. By mapping legal texts into electronic format suitable for adaptive

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[35] See more in David Crystal, *A Dictionary of Linguistics and Phonetics*, 6th Edition, Wiley-Blackwell, 2018.

[36] B. Thalheim, *Entity-Relationship Modeling*, Foundations of Database Technology, Springer, Berlin Heidelberg 2000.

[37] Who invented mind mapping? https://www.mind-mapping.org, accessed: 15.04.2020.

[38] See more in B. Lee, N. Riche, A.K. Karlson, S. Carpendale, *SparkClouds: Visualizing Trends in Tag Clouds*, IEEE Transactions on Visualization and Computer Graphics, Vol. 16, Issue 6, 2016, p. 1182-1189.

[39] See more in C. Sammut, G.I. Webb, *Encyclopedia of Machine Learning and Data Mining*, Springer US, New York 2017.

[40] See more in Y. Wilks, M. Stevenson, *Sense Tagging: Semantic Tagging with a Lexicon*, Fifth Conference on Applied Natural Language Processing (ANLP-1997), Proc. of the Workshop "Tagging Text with Lexical Semantics: Why, What and How?", Washington, D.C, ACL, 1997.

linking, it is possible to develop tools which will be able to significantly support a legislative process and also further availability and readability of the text to users. To this aim, an approach based on division input text into consistent information nodes with placing adaptive hyperlinks, seems to be valuable and it is suitable for further automatization. In order to visualize the connection between information nodes and control the process of adaption dedicated maps can be used.

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