

The Content Analysis Method for the Information Resources Formation in Electronic Content Commerce Systems

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Abstract

The article on developing the unified method of processing information resources in electronic content commerce systems (ECCS) is devoted. A model and a typical generalized architecture of an ECCS are developed. Strategies for designing and implementing ECCS using an on-line journal and newspaper that reflects the results of theoretical studies are developed. The general approaches for creating these systems, typical architecture and standardized methods for content formation/management/support. The on-line journal and newspaper is a typical example of an ECCS, which refers to managed cybernetic systems and has a certain properties set. Articles content is based on the on-line newspaper/journal, according to which the user searches to obtain the necessary data. However, texts filled with keywords are not always enough to get the required content by the user. Highlighting keywords in each article is a laborious and lengthy process. Using a formalized method of content analysis, the process is fully automated and occurs when the author adds a new article. The method defines similar articles to topics viewed by the user. The using content analysis advantage is to determine the content availability for a specific request, for example, to determine the lack of content on a specific topic and the authors' focus on this issue development.

Keywords 1

Electronic content commerce system, information resource, information technology, intelligent system, content commerce, commercial content, content analysis, processing information resource, text analysis, on-line magazine, natural language, textual content

1. Introduction

The problem of processing information resources in ECCSs is relevant through the active development of research in e-business and the lack of theoretical justification for methods and software tools unification for content management, formation, and support [1-3]. New approaches/ways to solve this problem appear, but there is a mismatch between the well-known technology of processing information resources and the principles of building ECCSs. There are no general approaches for creating these systems, typical architecture and standardized methods for content formation/management/support [2-6].

The relevance of the topic is due to the globalization of e-business;

- Increased demand for commercial content and quick access to it;
- Uneven functioning of business processes following the regions;

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- The need to promptly / regularly / periodically receive the necessary content;
- Saving time/resources in obtaining the essential content;
- Personalization in the provision of services and the integration of ECCSs.

The advantages of introducing these systems are to increase the efficiency of receiving content; shortening the cycle of production and sale of commercial content; lower costs associated with the exchange of content; openness towards users; automatic informing users on-line; creating alternative sales channels [1]. The peculiarity of using ECCSs is [7-9]:

- Direct interaction with the user (reduction of distribution channels and elimination of intermediate links),
- Openness (access for all companies/users and low barrier to enter the market) of ECCS processes,
- Infinity in time (access at any time),
- Globalism (access from anywhere in the world),
- Automatic processing of requests and tracking information about users reduces the cost of operating the e-business and provides SRI additional information interactively [9-13].

2. Related works

Active development of the Internet contributes to the growth of demand for commercial content and new forms for Web services [1-2]. Textual content, prepared according to users' needs and designed to meet them, is a commercial content and the main object of e-business. The ECCSs implementation /development is one of the strategic areas of e-business development. A characteristic feature of such ECCSs is the Web resources processing to increase content sales to regular users actively attract potential users and expand the boundaries of the target audience [14-21]. In particular, the e-business technologies and principles are actively used in the software creation for on-line/off-line content sale in such systems as the Internet store, Cloud storage/computing, analysis, transfer and storage of content (Table 1).

Table 1
Directions for the development of electronic content commerce

Specialization	Specialization characteristic
On-line selling	Content distribution through on-line newspapers, on-line magazines, distance learning, on-line publications in the form of dictionaries/directories, on-line publishing, entertainment/information/children's portals.
Off-line	Sales of content through systems such as RSS Subscription Extension, Marketing Services Shop, copywriting services
On-line store	Content systems such as files, forms, certificates, articles, manuals, digital art, picture, movies, music, video, software, eBooks, and more
Systems cloud storage /computing	Cloud storage systems (Windows Azure Storage, Ubuntuone, iCloud by Apple, Google Cloud Storage, FilesAnywhere, EMC Atmos, Amazon S3) and cloud computing (Microsoft, Palm Pre, Android, iPhone, Linux, Mac, Windows, Apple, Google) to save different types of content or just movies, music, media / images. Cloud computing service delivery models include infrastructure such as IaaS (Red Hat, Rackspace, VMWare, Microsoft, and Amazon), platform as PaaS (Google Apps), and software as SaaS (Google docs, Gmail).
Systems analysis content	Site analysis services, content verification/validation, search frequency determination, keyword positioning. There are special programs, services and search engines for images to test the uniqueness of the content. Google / Yandex / Rambler search engines allow you to check for plagiarism by typing ≤ 100 characters in quotation marks in the search bar. Web analytics systems are the tracking, gathering, and measuring of quantitative/qualitative data on the attendance of an information resource, followed by their analysis. The main task

	of Web analytics is to optimize your site and Internet marketing initiatives. Google Analytics is a powerful tool for tracking sites of any size
Systems management content (CMS)	CMS (Drupal, Promodo, Kasseler, Aurus, LiteDiary, SiMan, VaM Shop, Impresspages_CMS, OpenCms, Santafox, e107, PHP-Nuke, PHP Fusion, Xaraya, TYPO3, Mambo, Plone, osCSS, OpenCart, PrestaShop, Magento, Business Catalyst, Joomla) is divided into Open source software for Python, Proprietary software, software as a service, Microsoft ASP.NET, Java, PHP, Ruby on Rails, CFML / ColdFusion Markup Language, File / flat file, Perl, Java packages, other. Content management framework (CMF) technologies that allow you to create CMS.
Programs-customers	BitTorrent file sharing. Allow organizing networks with the same privileges of participants (at the same time are clients and servers). Share on cross-platform intended for Android, Mac OS, <i>Windows</i> or GNU / Linux / UNIX.

The practical factor of the problem of processing information resources in ECCSs is associated with solving the problems [22-27]:

- The fast growth rate of Internet content and the spread of access to it,
- Expanding the recruitment and growth of demand for content/services,
- The active development of e-business,
- Creating technologies / tools and expanding the scope of the methods of formation,
- Content management and support [2]

The leading world manufacturers of information processing tools actively work in this direction, notably Oracle, Open Text, Microsoft Alfresco, IBM, SAP, EMC, CM Professionals organization, AIIM, and Google. The theoretical factor of the problem of processing Web resources in ECCSs involves the development of unified methods for the formation/management/ support of content based on research in the field of e-business and scientific works of leading scientists (Table 2) [28-42].

Table 2

The main theoretical results in the field of electronic content commerce

Method	Characteristic
Analysis of information flows	In the works of D.V. Land, S.M. Braichevsky, A.N. Grigoryeva, V. N. Furasheva investigated and developed mathematical models of electronic information flows and their estimation [9].
Keyword Analysis	George Kingsley Zipf proposed an empirical pattern of the frequency words distribution in a natural language [2, 9].
Capture events	G. Salton and R. Papka pronounced the idea of the emergence of new trends in informational flows [9].
Content lifecycle	Halverson, Woods Randy, Bob Doyle, Russell Nakano, Ann Rockley, JoAnn Hackos, Gerry McGovern, Bob Boiko, McKeever Susan described life cycle models of content [2].
Content analysis	They started the methodology of D. Robertson, Strauss, Glaser, A. Lindesmith, J. Kaiser, D. Wilcox, D. Spiida, A. Tenni, B. Matthews and actively developed F. Joubish, E. Babbie, O. Holsti, H. Lasswell, Stemler, J. Naisbitt proposed a methodology for exploring texts to determine authorship, authenticity, or meaning. K. Krippendorff and K. Neuendorf have developed methods for quantitative and qualitative text analysis. D. McKeone found a difference between prescriptive analysis and open text analysis [2].
Content management	Oracle, Open Text, SAP, Microsoft Alfresco, IBM and EMC have developed Content Management Interoperability Services (CMIS) specifications for Web Services interfaces designed to provide interoperability between ECM systems. The Interoperable Content Application toolkit interacts with content from

different repositories through a service interface and a custom CMIS Implementation, developed by each CMIS participant independently [2].

Computer linguistics Natural-language texts analysis consists of sequential processes such as semantic, syntactic and morphological analysis. For each analysis, appropriate models and algorithms are created for such natural language processing tools development as educational didactic, semantic/syntactic/morphological analysis, annotation, machine translation, content retrieval systems, etc. [2- 6].

The paper presents solutions to this problem in the form of a theoretically sound concept and description of the corresponding unified methods by processing Web resources based on the principles of construction and functional capabilities of the respective systems.

3. Material and methods

A Web resource in ECCSs is a set of data with a set of properties (Table 3), which are the object of the action of the technology for converting them into commercial content. The result of applying one technology is an information resource of another [2].

Table 3
Properties of Web resources in ECCSs [43-47]

Name	Property
Heterogeneity	The presence of content of different origin, content, and format of presentation.
Consistency	Lack of conflicting/opposing content values.
Accessibility	Accessibility for all users based on standardized methods /tools/interfaces.
Openness	The ability to interact, exchange values and share with external resources.
Dynamics	Quick update in accordance with the conditions of the system or the external environment.
Scalability	The ability to change the logical/physical volume of content (the number of quantities/concepts and their notation).
Controllability	Change control/use of content and its impact on processes by elements/users of the system.

Content - in the field of information technology (IT) is formalized content and knowledge in the system without a detailed specification of their properties, formalization, and ordering [2]. Converting data that is heterogeneous in nature /content/origin into a coherent centralized information resource is essential for building and functioning ECCSs. Important tasks are ensuring the information needs of problem-oriented elements of the system, maintaining access to content of various categories of users, observing data integrity and consistency rules, minimizing / controlling excess content, the ability to develop / change the internal organization of an information resource, observing the quality and effectiveness of content [1]. It is necessary to ensure the invariance of the environment of ECCSs to modify information resources in such changes [1-2, 48-52]:

- Presentation methods, formats and internal organization of content;
- Storage environments for content, physical units, and hardware;
- User requirements for content;
- The emergence of new requirements and categories of users;
- The order of distribution of content and user access methods.

There is a problem of creating a single conceptual description of an information resource to maintain external/internal designations of content in accordance with their tasks/requirements/ changes. Therefore, we classify information resources for the study of their natural / technological / consumer qualities in order to identify characteristic / specific properties, as well as patterns / features of their formation / application. The classification is based on the basic properties of content (syntax, structure, and semantics), based on which the main classification factors are selected [1-2]: ways of presenting content; resource structuring methods; resource access paths; resource assignment. The general

principles of Web resource formation in ECCSs (Fig. 1) determine the procedure and methods for selecting information from primary sources, filtering, fixation, converting to a specific format for generating the content and placing it in a database. There are plural N predefined primary sources of fixed / variable content. Each source of information x_i ($i = \overline{1, N}$) forms a set of values of information/knowledge/facts from the subject area of the ECCS [2, 53-60].

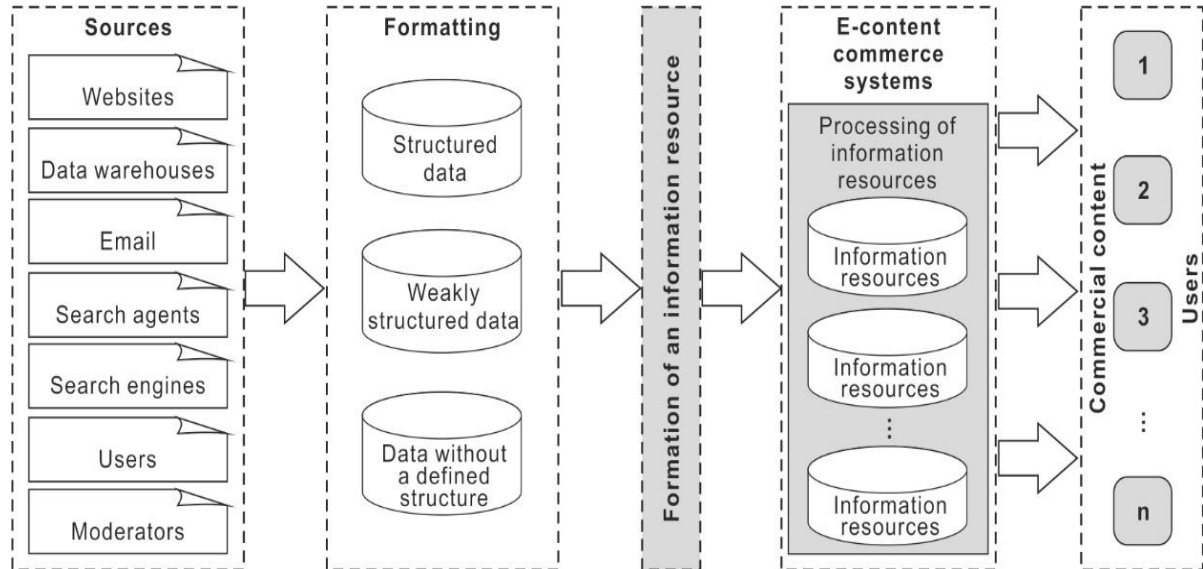


Figure 1: The procedure for the formation and use of Web resources in ECCSs [1-21]

The result of the appeal of technological means to the source x_i is the generation of a variety of values $X(x_i)$, which is perceived, fixed and served in a certain form. The set of values generated by each information source is converted into an input content set of a specific format X_i ($i = \overline{1, N}$). Each set of content is presented in structured, loosely structured data or without a detailed description of the structure [61-69]. Structuring the content involves forming each set of reports its composition, ways of combining elements and their ordering (plural of conditions U_i , where U_i) [70-76]. Each set of content is a combination of many values in a given format and plural of conditions $\langle X_i, U_i \rangle$. In the case of the formation of an input content set without a description of the structure $U_i = \emptyset$. The received content, before formatting and saving, goes through the verification / validation procedure to confirm formal / substantive correctness / relevance according to the requirements of the system. In case of non-compliance with the specified criteria is withdrawn from further use [77-90].

Formally, we represent such a sequence of technological processes as a chain:

$$x_i \rightarrow X(x_i) \rightarrow X_i \rightarrow \langle X_i, U_i \rangle \rightarrow \text{Verification}(\langle X_i, U_i \rangle) \rightarrow \text{Qualification}(\langle X_i, U_i \rangle) \rightarrow \quad (1) \\ \rightarrow \text{Conversion}(\langle X_i, U_i \rangle) \rightarrow \text{Downloading}(\langle X_i, U_i \rangle) \rightarrow \langle X, U \rangle, \quad \text{npu } i = \overline{1, N},$$

where N is the number of sources,

x_i is i the source, $X(x_i)$ is the set of generated values,

X_i is the set of selected content,

$\langle X_i, U_i \rangle$ is the set of content with many conditions,

$\langle X, U \rangle$ is system resource,

$\text{Downloading}(\langle X_i, U_i \rangle)$ is content loading,

$\text{Conversion}(\langle X_i, U_i \rangle)$ is content conversion,

$\text{Qualification}(\langle X_i, U_i \rangle)$ is qualification,

$Verification(X_i, U_i)$ is verification

The Table 4 presents the architectural principles of building information resources in ECCSs, [1-2, 5-6, 9-10]. The formation of the information resource is carried out by the method of homogenization/distribution/ integration (Table 5) [1-27].

Table 4
Architectural principles for building information resources in e-commerce systems

Principle	Information Resource Property
System	Building a resource requires consideration and coordination with the requirements/functions of other components of the system.
Complexity	In its composition, presentation formats, and content, the resource is heterogeneous, therefore, when it is formed, they provide a combination of heterogeneous elements into a single coherent set.
Fullness	The composition of the information resource ensures the fulfillment of all tasks and functions of the system.
Integrity	Compliance with the structure (provides an isomorphism of the states of data units and the relationships between them when they are updated), semantics (forms a relevant interpretation of each unit / aggregate of data in all states of the resource) and functionality (ensures the performance of all functions of the system when changing the states of its resource).
Openness	The ability of a resource to interact and exchange content with resources of other systems/sources.
Interoperability	The content, methods of perception, application, interpretation, and functioning of the resource do not depend on platforms and implementation technologies and are unchanged when the system functioning environment changes.
Continuity	The new state of an information resource when updating directly depends on the previous one (it is a function of it and a set of operations on it).

Table 5
Methods of forming Web resources in ECCS

Title	Characteristic
Homogenization	<p>The formation of a single homogeneous set of content, namely:</p> <ul style="list-style-type: none"> obtaining knowledge and information from various previously defined sources in an arbitrary informal form; formalization / standardization of received from sources and presentation in the form of thematic content; verification of content (verification of compliance with syntax rules, content, completeness, lack of repetition, etc.); content downloads (manual / automated placement of content in a database with additional conversion from an intermediate format to a specific one).
Distribution	<p>Autonomous formation and use of local components (sets of the content of certain content, structure, and purpose with a set of technologies for creating /maintaining/managing/ access) of a single global content set.</p>
Integration	<p>An integrated resource forms a consistent set of values/information /knowledge/facts suitable for sharing. All components of an integrated resource are available for use within a single set of methods, tools and technologies. The effect of using a global integrated information resource exceeds the total effect of using all local resources (components of the integration process).</p>

Performing the sequence of steps of forming the resource by the method of homogenization, a lot of content as a result is formed/replenished. The objective of a set of distributed resources management tools is to organize the coordinated work and interaction of local technological tools to ensure the sharing of all / part of local resources. The first two methods have a number of disadvantages (Table 6) [1-27]. The main factors in the development of the integration method are the increase in the share of poorly structured data and without a preliminary description of the structure with an increase in the volume of resources.

Table 6

Comparison of the methods of generating information resources in e-commerce systems

Title	Advantages	Limitations
Homogenization	They are used in the following cases: there is only one way of presenting content and a set of tools/technologies for its support; sources are predefined, identified and specified; the number of sources is small; information from sources is suitable for converting to uniform, unified formats.	Resource formation requirements are stringent; their implementation is problematic and often impossible.
Distribution	The main area of application of distributed resources is the Internet, although the approach is often used in the construction of large-scale corporate systems (distributed databases).	The share of distributed resources of a weakly structured type or without a predefined structure is growing. Therefore, special systems are used.
Integration	Allows you to: <ul style="list-style-type: none"> • Combine content of different formats, contents and origin in a single agreed set; • Combine content without generalized formatting Build virtual custom images of content that are not dependent on their actual appearance; • Operate with various content in its combination; • Dynamically supplement, modify and transform content and its descriptions; • Provide unified technologies for the perception and application of a large number of different content. 	No limitations.

A feature of the integration method is a homogeneous/heterogeneous result that requires physical movement of the data or uses their virtual images, a single global description of the data, or many local descriptions. Thus, it is possible to form an information resource as a single coherent consistent set of data suitable for use in solving a wide range of diverse tasks/problems in various directions of development of the electronic content commerce industry (Table 7) [1-27].

Table 7

A set of urgent tasks in various areas of development of the electronic content commerce industry

Title	Explanation
Internet as a platform	The greatest success is achieved and actively developed projects that use the Internet as a platform for e-commerce [6, 12-19].

Provision of services	It is the provision of the services on the Internet and not the sale of software with the installation on the user's computer [6]. The highest user activity is concentrated here, and the purchase or free download of local software is on the periphery. The rapid success of Google (provides services) compared to Netscape (sells software) indicates a correctly chosen strategy on the eve of the dominance of Web 2.0 [6, 12-19].
Multilingualism	When serving users from all over the world, the need for prompt translation of the interface and content/site content is growing. Popular/common Internet services support multilingualism [12-19].
Independence from the user	Removes the need for regular official releases / updates [16]. Free open source software is being developed for users to independently create sites / portals according to the requirements of Web 2.0 [6, 12-19].
Linguistic components of the system	Active development of applications for editing the interface in real time by editors / users [6]. There is a growing demand for electronic dictionaries, systems for automatic spelling / grammar checking, automatic translation with mounting in the admin / editorial part of systems [2-9].
Non-rigid categorization	Grouping / structuring content according to semantics / content and key facilitate the implementation of content search algorithms [2-3, 6-9].
Content search	New approaches are introduced to present search results for users who rely more on semantics. Various linguistic filters are created to filter out random pages and spam, search by synonyms, check for viruses, etc. [2, 6-9, 11].
Use of databases	Access to unique databases (terminological / spelling, paradigmatic, for automatic translation, corpus of texts, etc.) for payment [6, 16].
Cooperation between network projects	RSS technologies allow you to receive data from a site without visiting it, display this data on other sites or locally in the program [1-3]. Mutual integration of projects requires applied linguistic programs, in particular, semantic analysis (for example, in the field of automatic or automated selection and grouping of news from various Internet resources) [1-9].
User as an active participant in the project	Popularity and / or commercial success directly depends on the number of users involved in the project, for example, as the author of texts (Wikipedia, LiveJournal) or media (YouTube, Flickr, Photo.net), comments / product reviews (Amazon), seller / buyer (eBay), contributors to the project database in a specific area of knowledge (Open Library), content owner (BitTorrent, Wikipedia), etc. [1-3, 5-6]. Attention to the user contributes to the weight gain of linguistic content on the site. User participation in the project provides for the provision of certain linguistic tools (programs for editing text with automatic spelling, terminology and translation dictionaries of the corresponding knowledge industry, etc.) [13].
User interest	They use <ul style="list-style-type: none"> • various psychological / psycholinguistic techniques, • the maximum simplification of the interface and convenience [15], • the lack of advertising, • acceleration of page loading speed (AJAX), • technologies for converting a site into an analogue of a regular program with a large set of functions and ease of use, for example, mail systems (Gmail), • Web-editors of texts / images, • electronic dictionaries and programs for automatic translation of text, office programs, etc. [1, 2, 6].

Cooperation with users	They build a specific hierarchy where users with trust are moderators / administrators of the project. They use the achievements of psycholinguistics and other disciplines related to linguistics [2, 6].
Electronic libraries	Google Books and the Open Library contain full-text corrugation books [6], which use automatic / automated text processing / recognition systems, bibliographic and cataloging systems.
Distance Learning	Applied linguistic programs related to linguistics, for example, distance learning of natural languages (Mova.info) [1-3, 6].
Blogs	Written communicative aspect (users comment on notes, know, communicate, etc.) [6], which led to a geometric growth of various text on the Internet and the need for new principles for its automatic processing by search engines and the development of text editing programs [2].
Social networks	The community is closed to outsiders and protected (Facebook, Vkontakte, Odnoklassniki) by professional or other interests [6, 19]. There are projects where a user's virtual workstation is created, which allows him to keep the sites he needs in one place without the need to visit them [2].
Computational linguistics	The communicative aspect of the Internet is growing, which is directly related to the language; therefore, the weight of research and development on computer linguistics in the functioning of ECCSs is also growing [6, 11].

Commercial content is a purchase / sale object between e-commerce participants [2], for example:

- Announcements of materials from other sections of the site or other sites (with a link),
- Information blocks that are divided into syndicates (for example, a weather block),
- Reference information (for example, holiday dates, event announcement, train schedule),
- Entertainment information (for example, a joke of the day),
- Advertising, buttons and links of information partners, statistics buttons.

The formal model of the commercial content life cycle is six elements [1-27, 77-90]:

$$S = \langle X, \textit{Creation}, C, \textit{Processing}, \textit{Distribution}, Y \rangle, \quad (1)$$

where $C = \{c_1, c_2, \dots, c_{n_c}\}$ is a lot of content,

$X = \{x_1, x_2, \dots, x_{n_x}\}$ is a lot of input information,

Creation is a function for creating content,

Processing is a function for processing content,

Distribution is a function for distributing content;

$Y = \{y_1, y_2, \dots, y_{n_y}\}$ is a lot of source information (Fig. 2).

→ **Content Creation** → **Content Processing** → **Content Distribution** →

Figure 2: Model of a content distribution system in ECCSs

One type of ECCS is the Internet magazine [5], that is, a lot of structured content (for example, electronic publications in the form of articles, announcements, digests, books, reports, blogs, comments, etc.) in the information resource, is designed to meet the needs of the target audience and perception using appropriate software over the Internet (Fig. 3) [1-27]. Advantages of implementing an on-line magazine: compact; cost-effective; instantly delivers any content anywhere in the world and at any time; not tied to the problem of replication; reduced to a minimum the distance between the author and the reader; new ways of conveying information to the reader. Automatic processing of electronic publications reduces the search time for the necessary content only by entering the appropriate address or keywords in the search system [1-27].

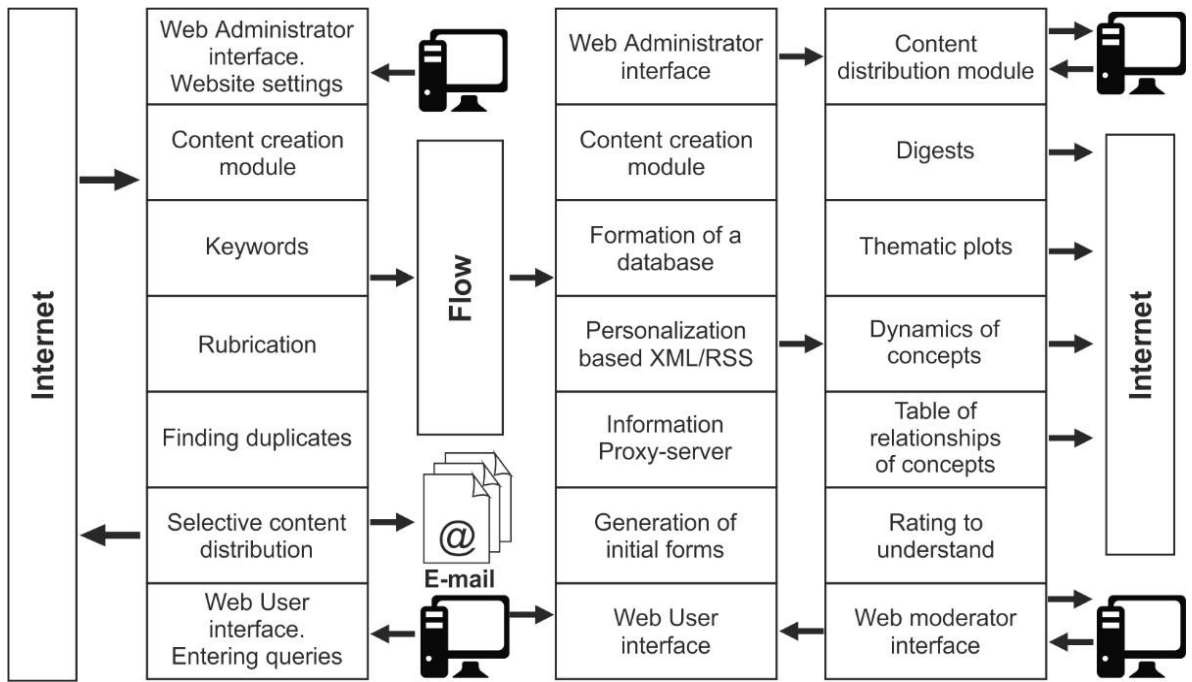


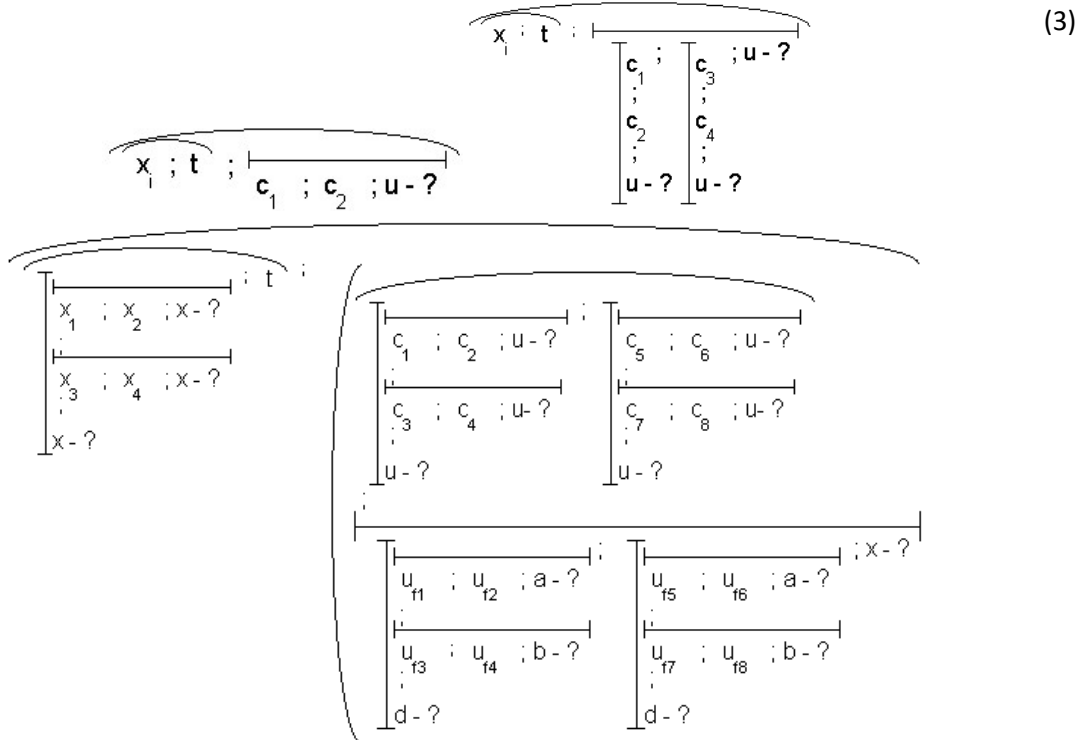
Figure 3: The interaction scheme of the modules of ECCs developed according to [9]

4. Experiments, results and discussion

The process of creating content is described by a function of the form $\vec{c}(x_i, t) = \text{Creation}(\overline{u}_C, x_i, t)$, where $\overline{u}_C(x_i)$ is the set of conditions for creating content, that is

$$\overline{u}_C(x_i) = (u_{c_1}(x_i), u_{c_2}(x_i), \dots, u_{c_{nuc}}(x_i)).$$

Content is created as $c_j = \left\{ \bigcup u_{c_k} \mid (x_i \in X) \wedge (\exists u_{c_k} \in U_F), U_C = U_{C_x} \vee U_{C_{\bar{x}}}, i = \overline{1, m}, k = \overline{1, n} \right\}$, i.e.



Content processing is described as

$$\bar{c}(q_i, t) = Processing(\bar{u}_P, q_i, t),$$

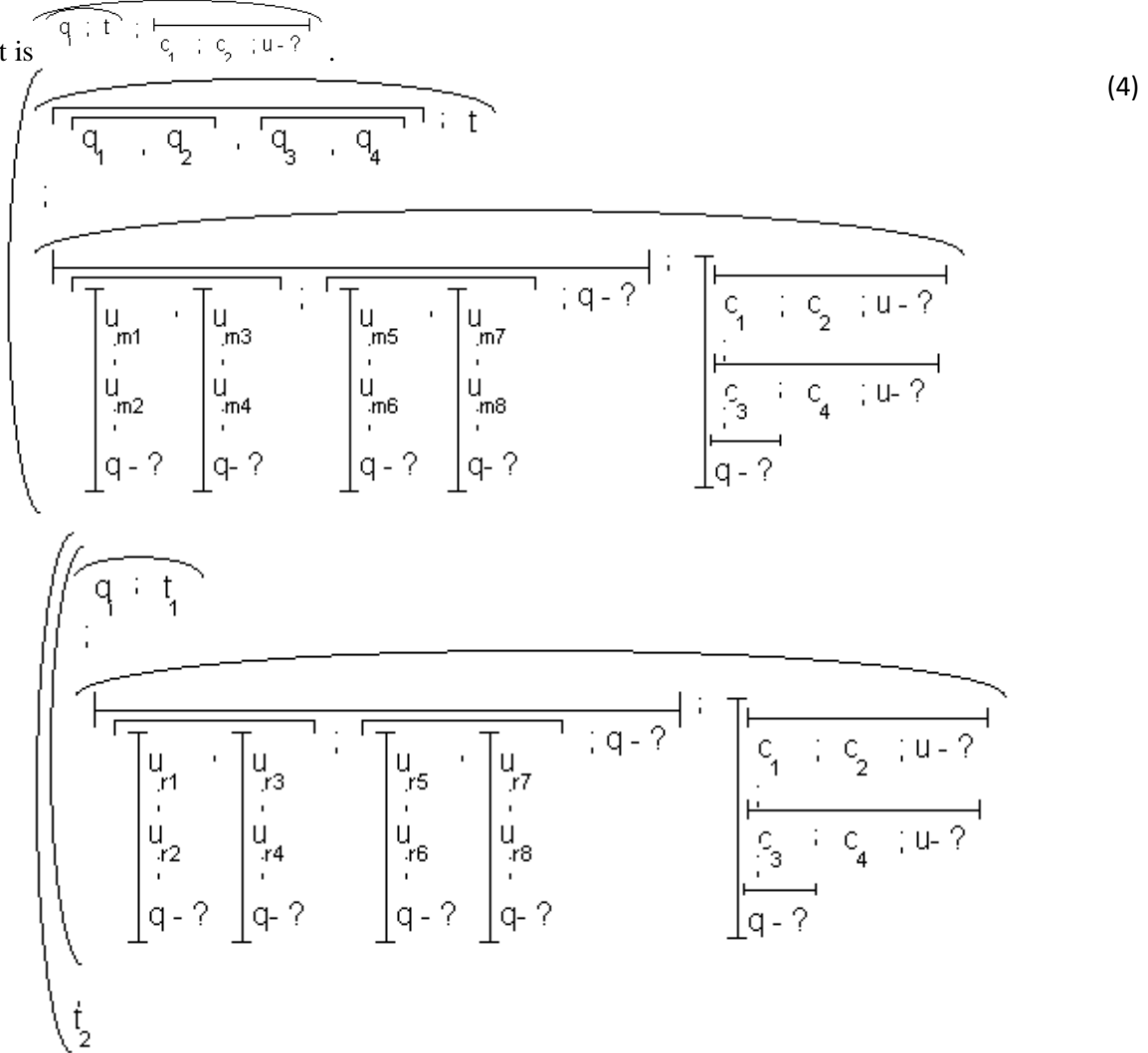
where $Q = \{q_1, q_2, \dots, q_{n_Q}\}$ is the set of user requests [2],

$\bar{u}_P(q_i)$ is the conditions set for content processing, that is

$$\bar{u}_P(q_i) = (u_{p_1}(q_i), u_{p_2}(q_i), \dots, u_{f_{u_p}}(q_i)).$$

Content processing occurs as $c_j = \left\{ \bigcup u_{p_k} \mid (q_i \in Q) \wedge (\exists u_{p_k} \in U_P), U_P = U_{Mq} \vee U_{P\bar{q}}, i = \overline{1, m}, k = \overline{1, n} \right\}$,

that is



The content distribution process is described as

$$\bar{y}(t + \Delta t) = Distribution(\bar{u}_D, \bar{c}, q_i, t, \Delta t),$$

where $\bar{u}_D(q_i, \bar{c})$ is the set of conditions for the distribution of content

$$\bar{u}_D(q_i, \bar{c}) = (u_{d_1}(q_i, \bar{c}), u_{d_2}(q_i, \bar{c}), \dots, u_{d_{m_d}}(q_i, \bar{c}))$$

when

$$y_j = \left\{ \bigcup u_{d_k} \mid (q_i \in Q) \wedge (\bar{c} \in C) \wedge (\exists u_{d_k} \in U_D), U_D = U_{Dc} \vee U_{D\bar{c}}, i = \overline{1, m}, k = \overline{1, n} \right\} \quad (5)$$

A well-known method of text processing is content analysis, that is, the study of the contents of text arrays / products of communicative correspondence (for example, comments, forums, electronic correspondence, articles, etc.). Content analysis consists in searching for information [7-8, 11] by

semantic units (phrase, topic, idea, author, character, social situation, and the text part, clustered by the content of the category analysis) and interpretation of the result (Table 8).

Table 8
Basic procedures for a formalized method of content analysis

Title	Features of the formalized method of content analysis
Identification of units	Depending on the content / goals / objectives / hypotheses, studies form many substantial units.
Allocation of units	The units of the account may coincide (counting the frequency of mentioning the selected semantic unit) or not coincide (the researcher forms based on the analyzed material) with the units of analysis.
Counting procedure	Classifications by distinguished groupings using special formulas (for example, estimating the specific gravity of meaningful categories in a text), statistical calculations of text comprehensibility / attractiveness.
Protocol development	Classifier general table with categories / units of analysis, which extremely clearly captures the units of expression of each category. For example, the categories of analysis in the questionnaire play the question and the units of analysis the answers. Content analysis contains information about the content (author, publication time, volume, etc.); the study results (the amount of use in specific units of analysis and conclusions by analysis category). The protocol is filled in encoded form for compact presentation of content and quick comparison of different content analysis results based on counting data of all registration cards (coding matrices, which indicate the number of units of account and the units of analysis are characterized).
Table development	The type of table is determined by the research stage, for example, in the form of a system of coordinated and subordinated analysis categories, which looks like a questionnaire: each category (questions) provides a number of features (answers) by which the text content is quantified.
Matrix development	If the sample size ≥ 100 units, then analyze the set of matrix sheets. Otherwise, a two-dimensional / multidimensional analysis is carried out, where for each text a coding matrix is built

Analysis units are considered against the background of wider linguistic/informative structures, indicating the nature of the segmentation of the text, within which the presence/absence of contextual units is identified. For example, for an analysis unit, the word contextual unit is a sentence. The unit of account is a quantitative measure of the analysis unit, allowing you to register the frequency (regularity) of the appearance of a characteristic of the analysis category for the content (the number of specific words or their combinations, lines, printed characters, pages, paragraphs, copyright sheets, text area, etc.). The sample parameters are determined by the objectives and scope of the study. Content is the backbone of the on-line magazine, by which the user searches to obtain the necessary information. However, texts filled with keywords are not always enough for the user to get the necessary information. In addition, the selection of keywords for each article is a long-term and time-consuming process. Using a formalized method of content analysis, the process is fully automated and occurs when the author adds a new article. Identify similar articles to those viewed by the user, and display them not. When using keywords, the user gets not quite similar, or completely different from the one that interests him (to increase the popularity of the article, authors add keywords on various topics). The advantage of using content analysis is to determine the availability of content for a specific request, for example, to determine the lack of content on a specific topic and the focus of the authors on the development of this issue. The on-line magazine has implemented the distribution of articles. Raw articles are sent to the input, sent to the article-processing unit. According to the rules, in search parameters, keywords and dates of the viewed articles, the articles are divided into categories (similar, popular, selected search or stop looking) and their placement in the database. The administrator controls the process. The

The actor is registered/authorized as the author in the ECCS, comments/posts articles. Actor A user is registered / authorized in the ECCS, evaluates, views, comments and searches on articles. Viewing articles by the user changes the data on the number of views of the article, including the output of an updated list of popular articles. Also, viewing and searching by parameters leads to a change in the data on viewed articles, including the output of an updated list of similar articles. Actor and Moderator generate/modify article search parameters. The ECCS generates and displays an articles list viewed by the user. Fig. 6a shows a weblog deployment diagram.

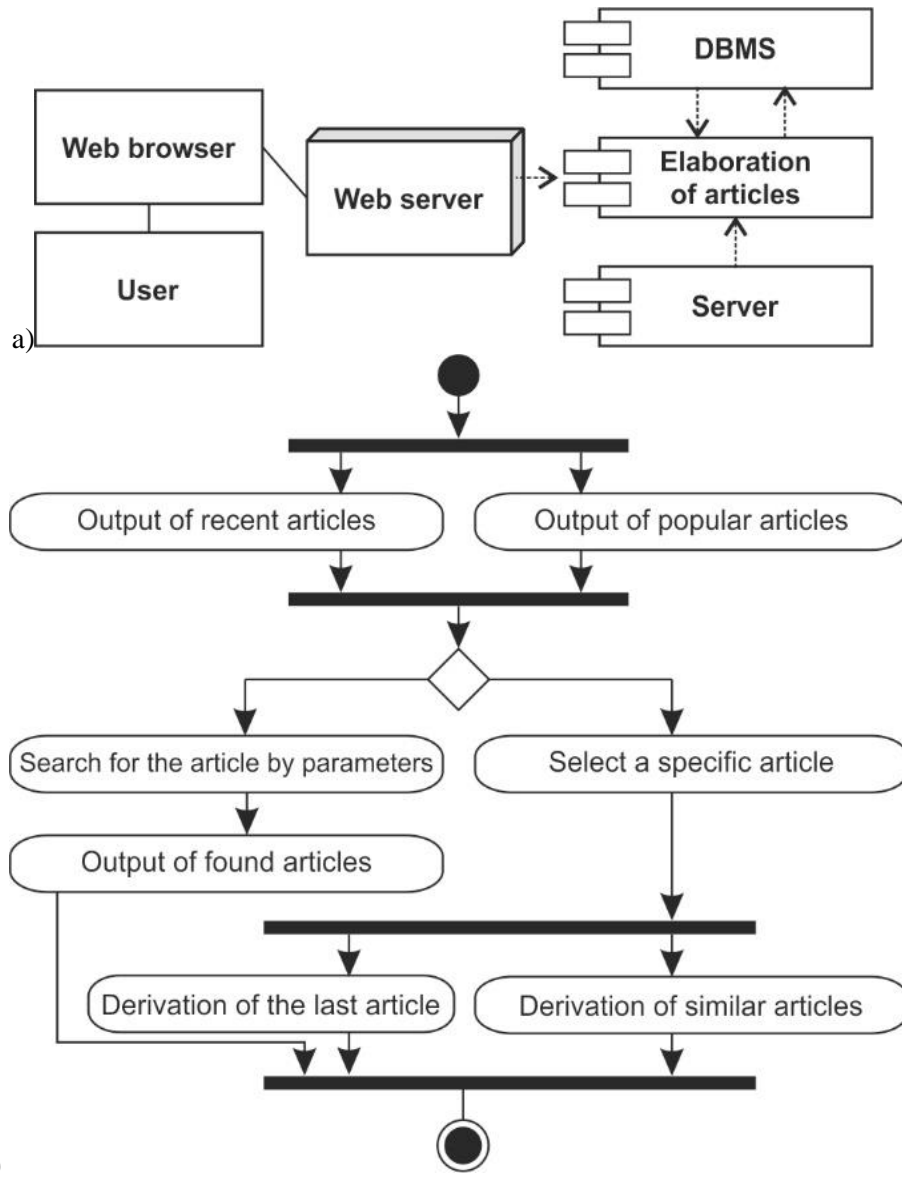


Figure 6: Diagram a) deployment and b) the activity of the ECCS such as Internet journal

After authorization, the user/author sends for processing the article. From time to time, information is exchanged with the database to form a new/popular articles list that meets the parameters search and the like reviewed by the user. All four of these article lists are submitted for viewing to the author/ user. Based on the lists received, the user makes a new request and the mechanism repeats. After performing the operations, the unprocessed author article is transformed into a developed article and stored in the database. It is used to search by keywords, popularity, size, and author. Fig. 6b shows a diagram of the activity of an on-line journal. The user is provided with lists of recent or popular articles that have the most views. The user can select a specific article to view, or search by parameters, leads to the conclusion of the selected / similar / found articles. In fig. 7 is a sequence diagram for an on-line journal and in Fig. 8 is a diagram of system components and dependencies between them.

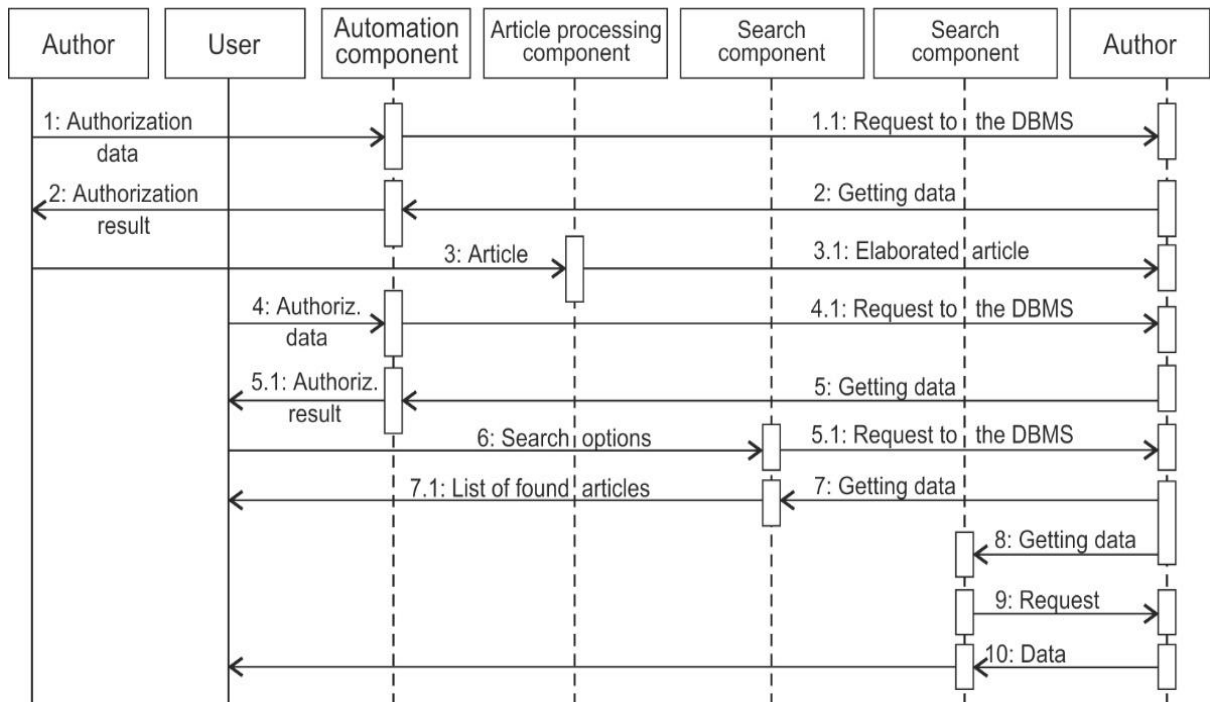


Figure 7: Sequence diagram of an e-commerce system such as an on-line journal

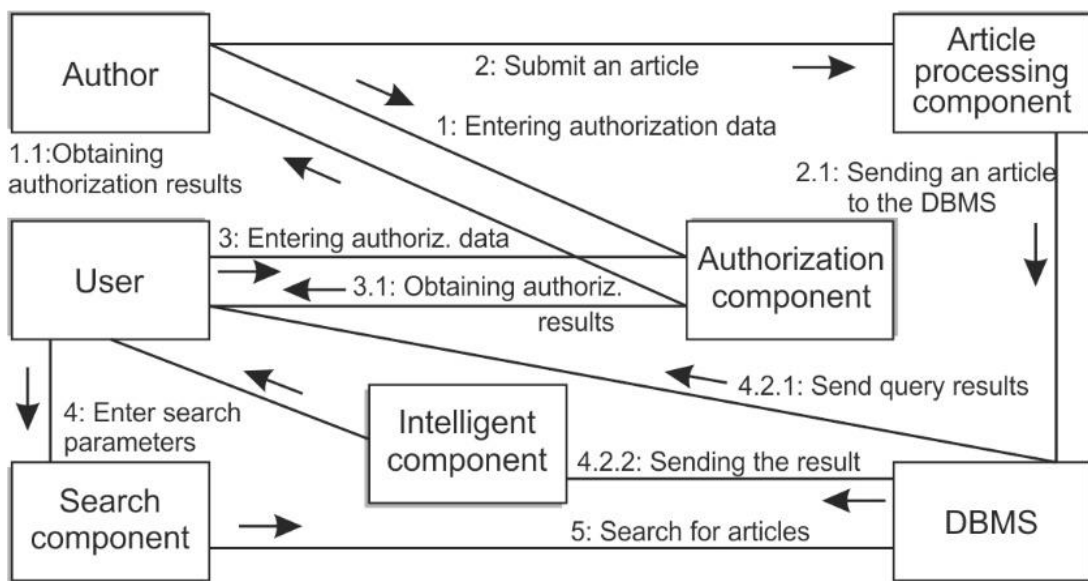


Figure 8: Diagram of components of an ECCS such as an on-line journal

5. Conclusions

The on-line journal and newspaper is a typical example of an ECCS, which refers to managed cybernetic systems and has a certain properties set. Articles content is based on the on-line newspaper/journal, according to which the user searches to obtain the necessary data. Nevertheless, texts filled with keywords are not always enough to get the required content by the user. Highlighting keywords in each article is a laborious and lengthy process. Using a formalized method of content analysis, the process is fully automated and occurs when the author adds a new article. The method defines similar articles to topics viewed by the user. The using content analysis advantage is to determine the content availability for a specific request, for example, to determine the lack of content on a specific topic and the authors' focus on this issue development.

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