

Analysis of business processes in electronic content-commerce systems

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Abstract. Practical factor of information resources processing in electronic content commerce systems (ECCS) is related to solving problems with increase in content amount on Internet, active development of e-business, rapidly spreading Internet accessibility, information products and services extension set, increasing demand for content. The aim was to develop methods and software of information resources processing to improve the efficiency of ECCS due to increased sales of content. Article is devoted to the standardized methods and software development of information resources processing in ECCS. In this paper an actual scientific problem of development and research in methods and means of information resources processing ECCS was solved with use of designed classification, mathematical providing and software and generalized ECCS architecture. ECCS classification was researched and improved on the basis of analyzing and evaluating of such systems. It made possible to determine, detail and justify choice of their functional possibilities for content lifecycle designing. The task of developing methods and software formation, management and support of information products resolved with a theoretically grounded concept by automating information resources processing in ECCS to increase content selling for constant user, by involvement of potential users and expanding the boundaries of the target audience.

Key words: information resources, content, content lifecycle, electronic content commerce system.

INTRODUCTION

Rapid development of the Internet contributes to increasing needs in receiving operative data of productive and strategic nature and implementation of new forms of information service. Documented information prepared in accordance with user needs is

an information product or commercial content and main object of e-commerce processes. The issue of design, development, implementation and maintenance of e-commerce content is relevant in view of factors such as lack of theoretical foundation of standardized methods and the need for unification of software processing of information resources. Principles and technologies of electronic content commerce are used in creating online stores, systems for on-line and offline sale of content, cloud storage and cloud computing. The world's leading manufacturers of informational resources processing tools such as Apple, Google, Intel, Microsoft, Amazon are working in this direction.

THE ANALYSIS OF RECENT RESEARCHES AND PUBLICATIONS

Term content or filling has few interpretations according to the direction of application [1-2]. For the computer science branch – it's informatively meaningful filling (for example: graphics, multimedia) of the information resource [2]; variety of all values, operated by information system [2]; certain generalized notion of data without pre-defined structure [2, 9]. Respectively, information resource – is a totality of structured/non structured content arrays in information system, for example: libraries, archives/repositories, funds, portals, directories/vocabularies, data banks/bases/warehouses, electronic commerce systems etc. [1-2]. Commerce content notion is determined as information resources

contents in electronic content commerce system (ECCS); ECCS business process object (for example: article, software, book etc.); structured variety, logically completed information, which is an object of relations between user and ECCS; data set without pre-defined structure, that exist only in electronic form; information of commercial appointment, indivisible in time; main factor of activity area formation, ECCS functioning and appointment [1-2, 33-38].

OBJECTIVES

This article describes the features, lifecycle phases and commerce content services management. The detailed analysis of content management systems and prospects of electronic content commerce systems implementation is made. A detailed classification of content commerce systems and electronic content commerce systems is made. Business processes, content flows, tools, content management systems models are analyzed. Methods and tools of content management, their advantages and disadvantages are described. Modern Internet progress causes increasing needs as in productive factor information so strategic resource information, and realization of new information service forms [1-38]. Documented information prepared in accordance with users needs and appointed to satisfy them is an information product or commercial content [2]. Actions for providing users with commercial content are information service. The Internet market is a totality of economic, law, organizational and program relations for sale/purchase of information products and services between developers/providers and users [2, 6-9].

THE MAIN RESULTS OF THE RESEARCH

Content distribution market provides technological progress of operational content preparing, which is available through information resources and depends on perception, image, and preservation of his values. For processing and solving certain tasks information system moderators are formalizing, analyzing, formatting and structuring content. Structuring process is content unit

determination, methods and orders of their combination amongst themselves and bigger from smaller content elements formation [2]. Formed content arrives to data base/warehouse, where his directions/subjects are defined, for example: electronic publications with bigger demand coefficient from information resource visitors/users

(Fig. 1). Structured content is concentrated, for example, in ERP/CRM, and non structured – in e-mail’s, freeform working papers and collective work provision tools and stored, for example, in ECMS [2].

Content lifecycle is complicated process, which content passes while being managed through different stages/phases of publication with such set of properties, as collaboration, inventory management, digital assets and versions that are supported by various technologies [2]. Existing e-commerce tools give system administrator/ moderator various content management possibilities (form, formalize, structure, add, edit, delete), but does not solve automating information resource processing problem. So content lifecycle realization is requires tools that realize forming processes, content management and support. Content is characterized by renewability/ modification time and has a set of specific properties (Fig. 2). Content volume is measured in information quantity units (bit/byte). Quantity/quality of content characterizes user’s degree of interest to information resource, where it is located [2]. Web-content – text, visual, sound content or part of information resource user’s experience. Business process management is an important phase of commercial content lifecycle. Determining commercial content parameter *topicality/accuracy* (latest information about defined question) requires clear business process management on the basis of workflow.

Economic content is an element of e-business subject economic activity (Fig. 3).

Content market based on Internet with information technologies knowledge management is a tool, that helps e-business functioning with commercial content spreading and his profitability growth for e-commerce subjects [1-2, 9, 17-20]. *Commercial content* is and

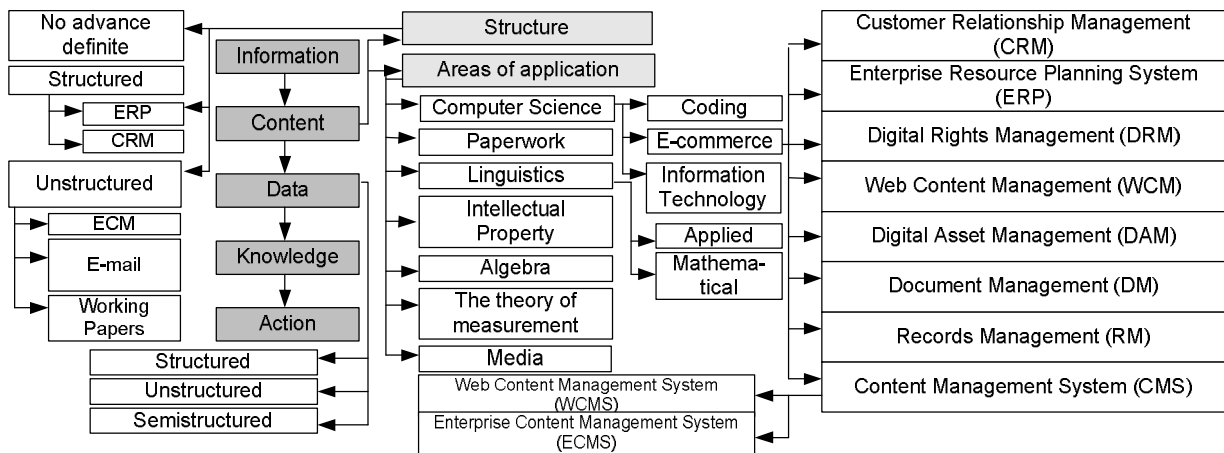


Fig. 1. Structure and directions classification of content use

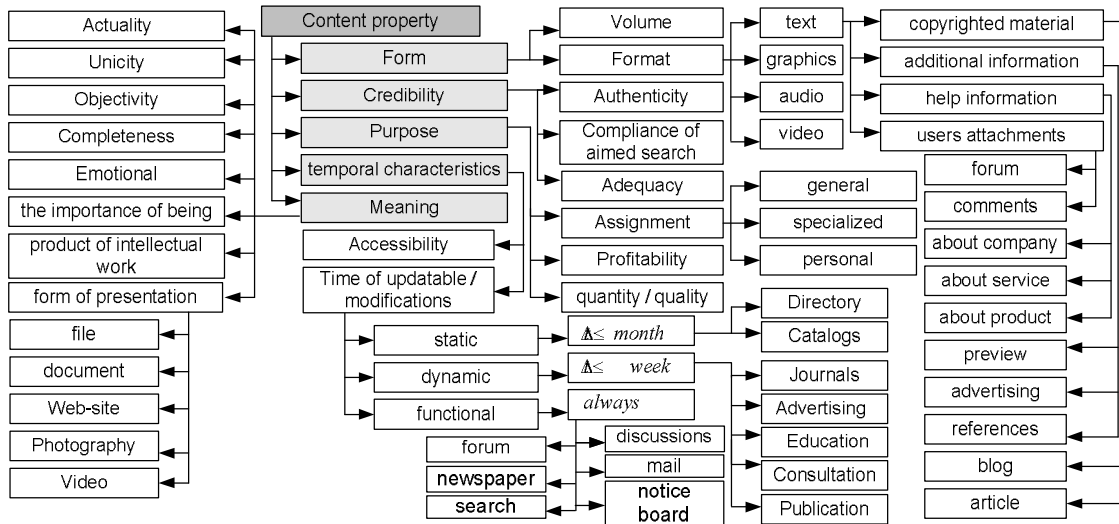


Fig. 2. Main content properties

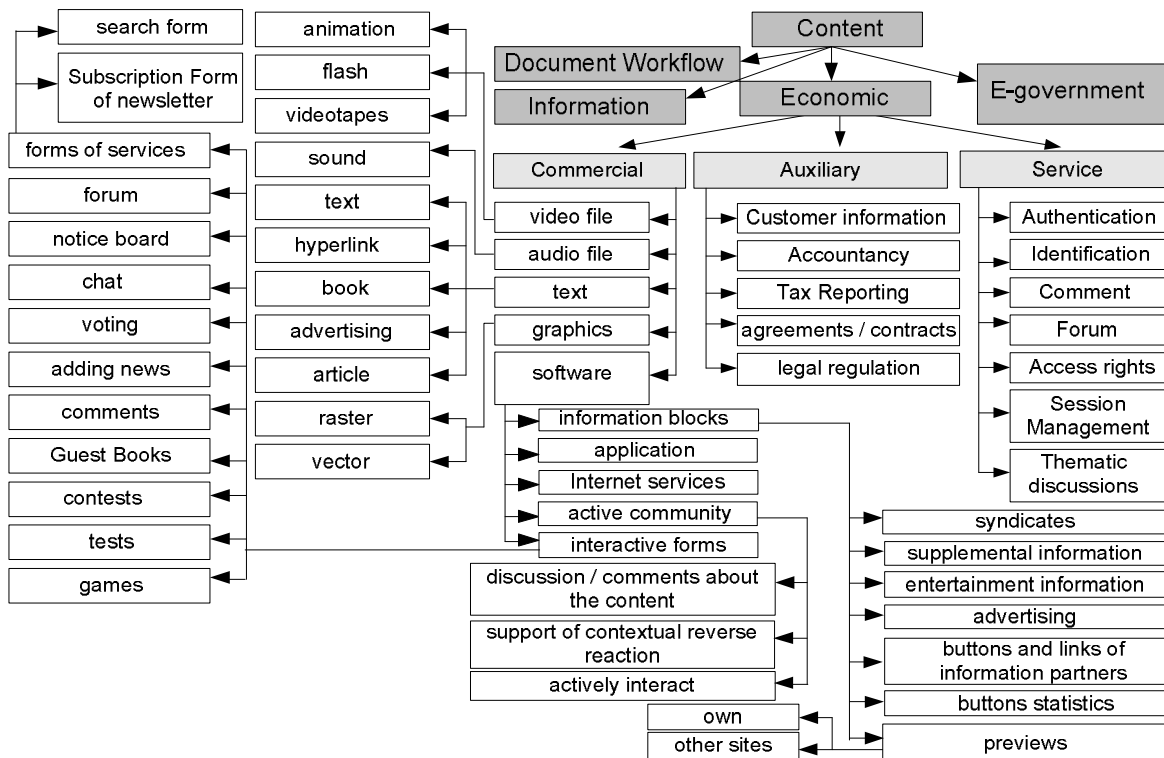


Fig. 3. Economical content classification

object of purchase and sale between e-commerce members [2], for example: information block that is divided into blocks (exchange rates, weather block), other sections/resources materials announcements (with links), referential information (holiday dates, event announcements, and train timetable) entertaining information (anecdote of the day), advertisement, buttons and information partners links, statistic buttons. EMC, IBM, Microsoft Alfresco, Open Text, Oracle and SAP corporations developed content management Interoperability Services (CMIS) specifications on Web-services interface for content management systems interaction (Table 1). CMIS does not specify single

system and security parameters configuration and does not solve integration problems [2, 9, 17-20]. Interoperable Content Application tools interact with content from different repositories via service interface and special module CMIS Implementation that is developing by each CMIS member [2, 17-20].

Electronic commerce is an e-business separate case (Table 2), for which commerce content is valuable asset [1-2, 9]. For fast business growth effective e-commerce policy is taken into account: protection of intellectual property; interactive confidence (content protection/privacy); free/open trading; active investments in infrastructure [1-2].

Table 1. Content Management Interoperability Services standard characteristics [17-20]

Name	Characteristic	Explanation
Standard goals	Single service	Allows application to determine operation variety that is performing in current context by specific user above specific object.
	Data integration	Providing new applications work with available repositories (archive data warehouses) and accumulated content in them.
	Authenti-cation	remains on repository, protocols and applications
	Language independence	Independent different repositories content management through Web-services.
	Web 2.0 support	Providing Web-services and interfaces Web 2.0 (IT, which simplifies application development, that changes user perception of Internet)
	Openness	Platform creation and support, independent from content language.
	Content formation	Composite applications and collages development support from several content sources, that looks like single unit
	Actions permissions	Determination of the allowed actions based on the internal authorization module.
Standard conceptions	Repository abstraction	Is independent from main data storage mechanisms. Standard determines interfaces for abstraction storage maintenance.
	Object typing	<i>Base object types</i> in repository – documents, folders, relations and politics.
	Types detalisation	Repository determines additional <i>object types</i> for any of the base types.
	Object properties	<i>An object type determines properties</i> schemes, that are allowed/required for object.
	Protocol Independance	<i>Data model and services</i> are independent of the protocol (supports protocols based on SOAP/REST), that is used for service launch.
	Services	Content management services availability
	Documents versions support	Objects <i>document</i> can be <i>versions</i> (objects folder, relations and politics are not versions). All methods for sending/receiving <i>documents</i> point if they are related to certain document <i>version</i> or always must receive latest version
	Multi-registration	Repository ability to support several document servings to zero/one/few folders simultaneously: Not allowed to serve folders few times.
Object types	Documents	Individual objects in repository that comprise/omit one content flow.
	Folders	Organizational containers, which store documents/folders.
	Relations	Free bonds only between two objects (documents, objects) in repository.
	Politics	Sets of an administrative rules, which are applied to objects.
Content management services	Type identification	Find <i>object type</i> and other repository data, including data about additional possibilities that are provided by specific repository.
	Modification	Create, edit and delete <i>objects</i> .
	Distribution	Distribute documents to multiple folders.
	Navigation	Repository navigation and search by hierarchy of folders.
	Versifi-cation	Create object versions (documents) and provide access to version history.
	Search criteria	Samples in any objects repository, that satisfy criteria of user determined search order.

Table 2. Main determinations of e-commerce notion

№	Definition
1	All goods/services trading forms through electronic means use, including Internet, which gives possibilities to develop new markets, but rises a question about safety of information and intellectual property [1-2], that the digital legal management is solving.
2	Wide interactive methods set of activity conducting of providing/selling goods/services to customers.
3	Any forms of business transactions, where sides interact via IT, but not in the exchange/contact process. For example: Electronic data interchange, EDI systems – totality of content creation, processing, management, passing, receiving, storage, use and destruction processes, that are performed with integrity check and confirmation of receiving if necessary [1-2].
4	Use of electronic communications and electronic data processing technologies for relations installation and editing, creating value between organizations and individuals.
5	Business transaction on-line in the following areas: direct products and services sales; banking and billing (payment systems); safe content placement; corporative purchases.

E-commerce system, ECS is information system with set of functions for electronic commerce processes automatic support (Fig. 4) [1-2, 9].

Electronic commerce systems are classified by e-commerce member's relationship type and main business process flow kind (Table 3; Fig. 5) [2].

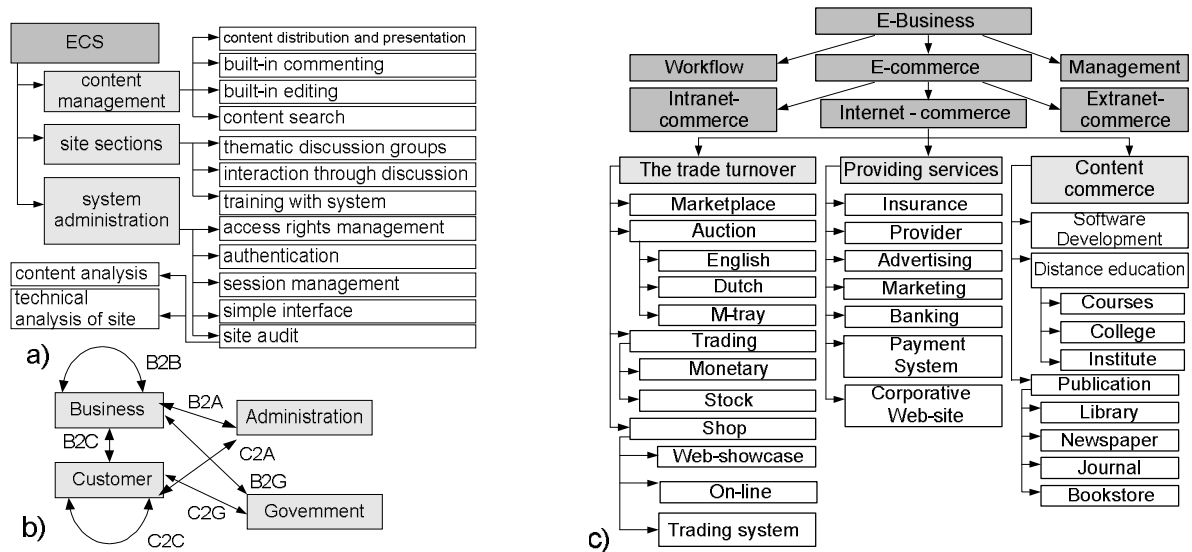


Fig. 4. a) Functions, b) relationships and c) e-commerce systems typology

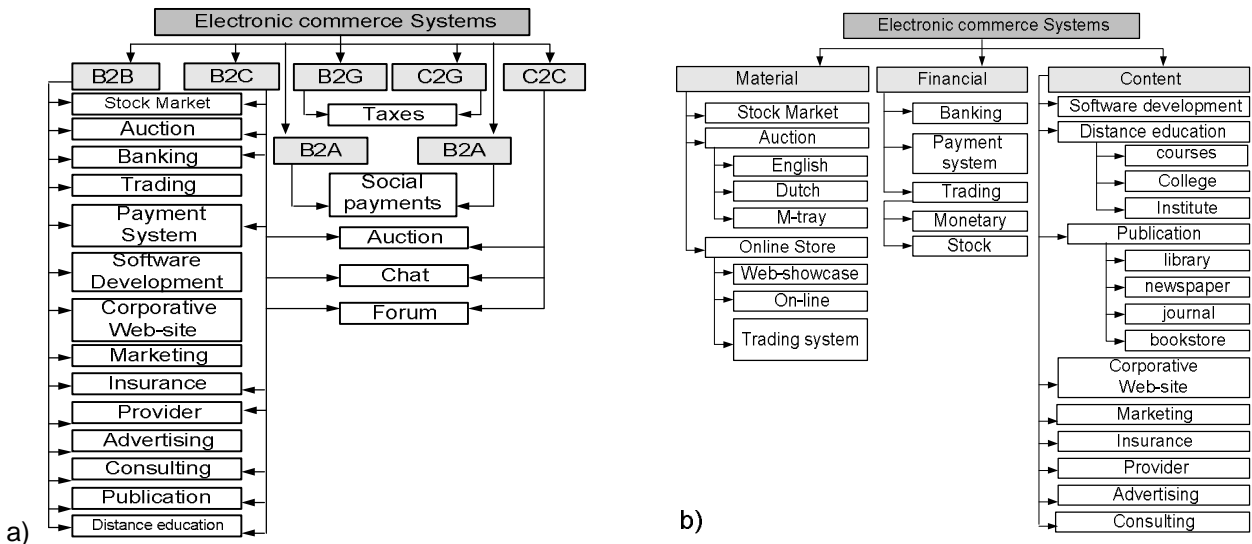


Fig. 5. a) Categories and b) Electronic content business processes

Table 3. Electronic commerce systems categories

Type	Category	Definition
B2B	Business-to-Business	Business operations between companies;
B2C	Business-to-Customer	Electronic retails;
B2A	Business-to-Administration	Administrative workflow;
B2G	Business-to-Government	Operations between companies and government departments;
C2A	Customer-to-Administration	Interaction with administration (social payments);
C2G	Customer-to-Government	Interaction with government departments (taxes);
C2C	Customer-to-Customer	Commercial activity between individuals

ECS is classified by activity: global electronic marketing; Media interactivity, that changes the paradigm of advertising business and market research; active development of e-commerce direction; operative services provided at a distance (counseling, law/accounting support, etc.); work on distance (distributed offices organization for collaboration from different world parts). Communication overhead are slight, and, as consequence:

global markets opening for small/medium business; increase in competitiveness and offers amount; development of new ECS modeling and design approaches; implementation of new product as a commercial content [1-2]. ECS implementation is hard through such problems as costs, value, safety, interoperability [1-2, 9]. The Internet provides an additional alternative way of doing business, but ECS must be integrated with existing ones

for avoiding duplicating functionality and their applicability, current work and reliability support. With the ECS ability to automatically share content business reaches cost reductions, work improving and increase in additional cost lances creation.

Electronic content commerce system, ECCS is information system of automatic e-commerce information resources processing processes support and commercial content promoting on global markets (Fig. 6, a).

ECCS prospects of development caused by totality of economical, social, electro-technology, law-organizational factors, among which significant is Internet multifunctional; liberalization of economic activity and economic globalization; organizational and technical

accessibility and financial-economic effectiveness of e-commerce for market subjects. Depending on the range of content, level of information technologies, status, creation manner ECCS is divided into universal/specialized/ independent/highly specialized; components of traditional publishing; corporate, personal, leased. Content is an important factor in e-business transaction (Fig. 6, b) with such features: a significant increase in demand for content; introduction of fundamentally new technology based on rapid development of e-commerce; rapid expansion of software for creating ECCS. The main areas of marketing services are products/services markets research and business partners search (Fig. 7, a).

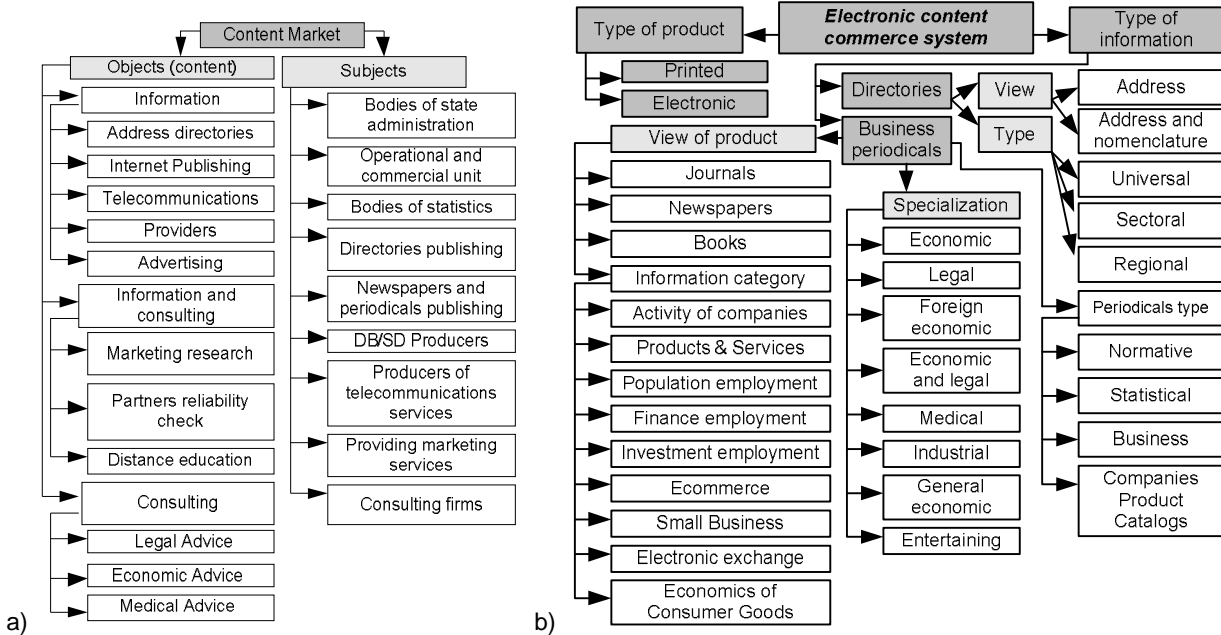


Fig. 6. Classification of e-commerce content by type a) commercial activity and b) commercial content

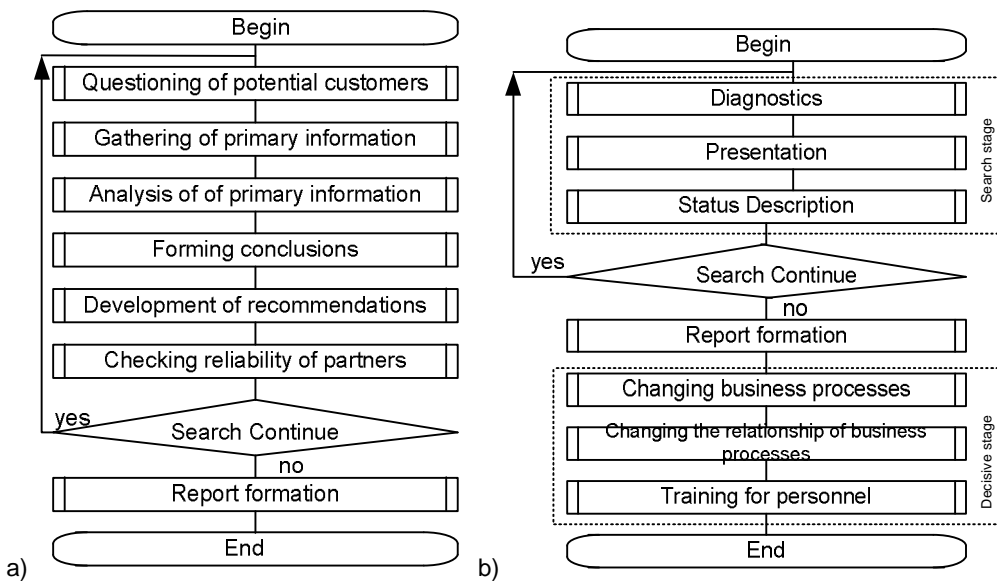


Fig. 7. Stages of granting a) marketing and b) consulting services

Content consumers meet the information needs in such ways: visiting information resources or data bases/warehouses; periodically receiving content via e-mail; connecting to specialized information systems/networks. Main consulting content granting problems (Fig. 7, b) are: debtor defaults, increase in prime cost, tax payments minimization, production realization on market. Main perspective research directions are improving/researching methods of e-business strategic planning and improvement; implementation of quality management systems, personnel and content streams management

systems and e-commerce technologies. Number of content flows is significantly greater, than ways of products displacement in industrial plants (Fig. 8).

Big part of the content flows consists of easily formalized and automated procedures (Fig. 9). ECCS is a core of content exchange process. Information resource processing in ECCS is a powerful and effective way to make e-business.

Main e-commerce tool – electronic content commerce system, whose Web-site is a relation between users and system (Table 4).

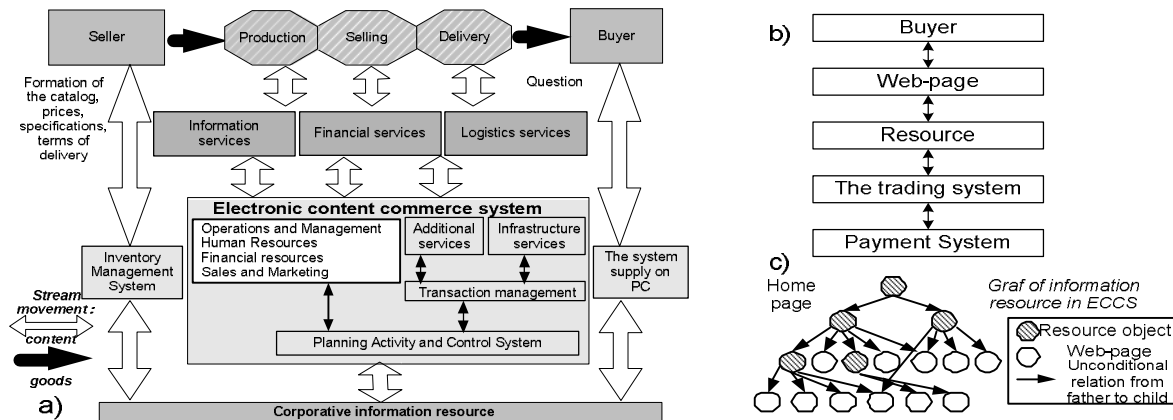


Fig. 8. Content flow scheme in e-commerce systems

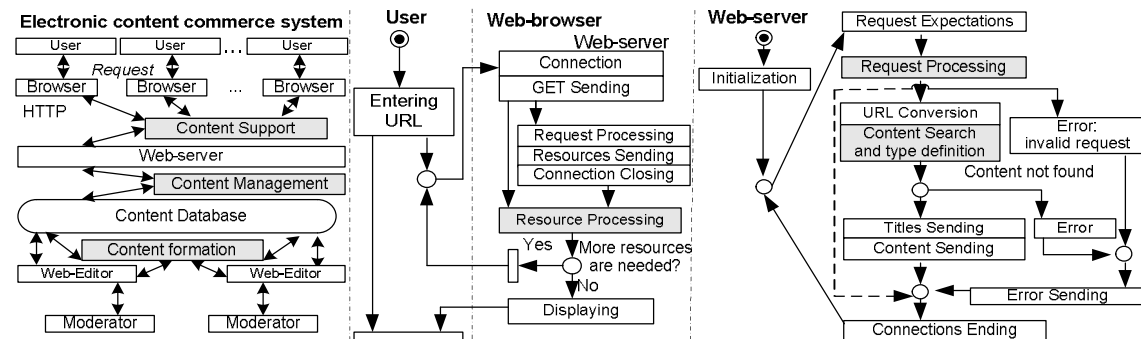


Fig. 9. Electronic commerce system functioning scheme, developed by [1]

Table 4. Electronic content commerce tools classification

Name	Definition
Corporative Web-site	Information page/resource with information about company, project, content, activity type, proposals for cooperation. Information resource with content about company, project, commercial content, activity type, proposals for cooperation etc., which has hierarchical structure and optimal scheme of functioning.
Internet – publishing house	Variety of Internet store, where product is thematic content topical during certain time classified and submitted to information resources.
Provider	Access to the Internet and information services.
Internet advertisement	Commercial promotion of consumer product qualities in order to increase demand.
Distance education	Profile courses or distance education (where content – knowledge variety) with further specialty or document about learning specialty receiving.
Content portal	Complicated system of company business processes and content flows management is established on the basis of corporative information resource and integrated with ECCS.
Internet marketing	Production/sales activities management system of companies / firms, based on complex market analysis, demand, prices, advertisement studying/forecasting, funding and planning coordination, new content sorts creating etc.
Software development	Software designing, development and support on-line via Internet.

Content management system, CMS is information system for information resources organization on the Internet, Intranet or Extranet [1-2]. CMS process functioning output information is data about purpose and conditions of the system that determines main goal of modeling and allows formulating requirements to formal model of S system and content management models. Content management system formal model – set of values $S = \langle X, Q, C, V, H, Function, T, Z, Y \rangle$, which describe system functioning process and create subsets, (Table 5 and Fig. 10) [2, 9]. Values x_i, c_r, v_l, h_k, y_j are disjoint subsets elements and contain deterministic and stochastic components [2, 10]. Incoming effects x_i , effects of the commercial content flow c_r , the external environment effects E and internal system parameters are independent

variables and output characteristics of the system are dependant. CMS S work process described $y_j(t_p + \Delta t) = Function(x_i, q_d, c_r, v_l, h_k, t_p, z_w)$, where x_i is visitors/users requests to the content management system. According to Google Analytics [5] $y_j = \{a_1, a_2, \dots, a_m\}$, where: a_1 – number of visits over time Δt ; a_2 – average time on information resource (min, s); a_3 – fault indicator (%); a_4 – reached aim; dynamics (%); a_5 – total number of page views; a_6 – page views per visit; a_7 – new visitors (%); a_8 – absolute unique visitors; a_9 – traffic sources % (search engines, direct traffic or other information resources) etc. [2]. Values effects c_r, v_l, h_k , on z_w and y_j as a CMS work result are unknown and unexplored [1-2, 10].

Table 5. Content management system components

Name	Marking	Range	Plural
Input system effects	$x_i \in X$	$i = \overline{1, n_X}$	$X = \{x_1, x_2 \mathbf{K}, x_{n_X}\}$
Users effects on system	$q_d \in Q$	$d = \overline{1, n_Q}$	$Q = \{q_1, q_2 \mathbf{K}, q_{n_Q}\}$
Content flow effects on system	$c_r \in C$	$r = \overline{1, n_C}$	$C = \{c_1, c_2 \mathbf{K}, c_{n_C}\}$
External environment effects on system	$v_l \in V$	$l = \overline{1, n_V}$	$V = \{v_1, v_2 \mathbf{K}, v_{n_V}\}$
Internal system parameters	$h_k \in H$	$k = \overline{1, n_H}$	$H = \{h_1, h_2 \mathbf{K}, h_{n_H}\}$
System information resource components	$z_w \in Z$	$z = \overline{1, n_Z}$	$Z = \{z_1, z_2 \mathbf{K}, z_{n_Z}\}$
Content management transaction time	$t_p \in T$	$p = \overline{1, n_T}$	$T = \{t_1, t_2 \mathbf{K}, t_{n_T}\}$
Output system characteristics	$y_j \in Y$	$j = \overline{1, n_Y}$	$Y = \{y_1, y_2 \mathbf{K}, y_{n_Y}\}$

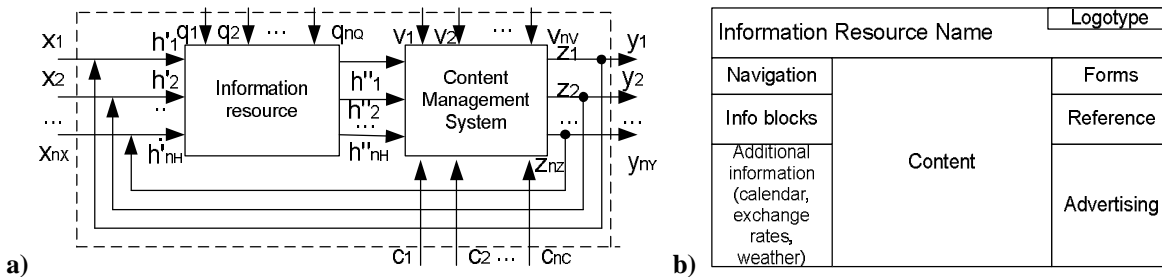


Fig. 10. Structure a) content management system and b) resource layout, developed by [10]

Formal CMS model does not reveal relations between input information, content, output information and content processing processes in system. Content commerce dynamics flow studying and information resources processing model building in CMS are important and topical [2]. For effective commerce content management process realization divide content plurality c_r to relevant/irrelevant and published/unpublished subsets (Table 6), where content plurals quantity is equal to: $a + b + d + g$ [1-2, 6, 9].

Table 6. Commercial content plural amount

Content subset	Published	Not published
Relevant	a	g
Irrelevant	b	d

In Table 7 are formulas which calculate effectiveness indicators of commercial content search [1-2, 6, 9]. One hundred percent quality search is impossible because of software tool power limit. Attempts are improved one of the parameters (accuracy/completeness) causes deterioration of another [6].

Table 7. Content search effectiveness indicators

Coefficient	Characterizes a content part	Around content array	Formula
Completeness	Published relevant	Relevant	$p = a/(a + g)$
Accuracy	Published relevant	published	$n = a/(a + b)$
Noise	Published irrelevant	Published	$e = b/(a + b) = 1 - n$
Sediment	Published irrelevant	Irrelevant	$q = b/(d + b)$
specificity	Unseen irrelevant	Irrelevant	$k = d/(d + b)$

Table 8. Commercial content lifecycle models classification, developed by [1-2, 16-32]

№	Author	Information resources processing		
		Formation	Management	Support
1	McKeever S.	+/-	-	+/-
2	Bob Boiko	+/-	+/-	+/-
3	McGovern G.	+/-	-	+/-
4	JoAnn Hackos	+/-	-	+/-
5	Ann Rockley	+/-	+/-	+/-
6	Russell Nakano	+/-	-	+/-
7	The State Victoria	+/-	-	+/-
8	AiIM	+/-	+/-	+/-
9	CMP organization	+/-	+/-	-
10	Bob Doyle	+/-	+/-	+/-
11	Woods Randy	+/-	+	+
12	Halverson	+	+/-	+/-

Table 9. Electronic commerce systems and electronic content commerce systems features comparison

System characteristic name	E-commerce	Electronic content commerce
Product immateriality	-	+
Stable product quantity	-	+
Product variety growth	+/-	+
Storehouse absences	-	+
Keeping product in databases	-	+
Efficiency of product promotion by keywords	+/-	+
Efficiency of product search by keywords	+/-	+
Automatic detection and liquidation of product duplication	-	+
Automatic product aging determination by content	-	+
Automatic product topicality determination	+/-	+
Automatic audience analysis	+/-	+
Automatic digest formation	-	+
Automatic distribution of products between members	+/-	+
Automatic distribution of digests between workers	-	+
Automatic product formation	-	+
Automatic product formatting	-	+
User's experience effect on sales amount increase	+/-	+

Dynamic flows of commercial thematic content are leads to limited models, opening way to further researches [1-11]. Content management models are assigned for content flow aging/topicality processes determination. They do not solve formation, content support problems. Commercial content lifecycle models authors suggest and describe several stages with set of properties that are supported by various technologies and processes (Table 8). In certain content lifecycle models project/content/ resource management concepts, information architecture, content strategies, semantic printing is foreseen. Different authors suggest various content lifecycle phases [1-4, 6-9]. Main phases (content creation, development, view, spreading and activation) are present almost in all offered models [2]. Content management processes, actions, status and role lifecycles vary in models depending on organizational strategies, needs, requirements and possibilities of models [2, 9, 16-32].

Considered content lifecycle models do not solve his formation and support problems and solve not all management problem: presentation set content to user according to his request, stories and information portfolio; automatic digest and information profile formation; thematic story detection and content meaning duplication; building relationship tables and content rating calculation; gathering data from various sources and their formatting; keywords and content notions detections; rubricating and content selective spreading. Existing e-commerce systems don't support all commercial content lifecycle and don't solve main information resources processing problems – content formation and support (Table 9). Lack of general and detailed classification of e-commerce content systems is led to the problem of defining and shaping general methods of design/development functioning architecture/ algorithms of these systems. This justifies

the purpose, relevance, feasibility and research directions. Known technology of content management is Internet marketing with Internet-integration, information management, public relation, service work with customers and sales in different areas [1-2].

Internet Marketing uses all aspects and the basic elements of traditional marketing, combined with new research methods and data analysis using modern technology (Fig. 11) [2]. Staying in constant contact with users is effective because of automatically tracking statistics. For its analysis return on investment, rate of return and conversion rate coefficients are used.

Conversion or information resource visiting efficiency – relation of information resource visitors quantity, that complete targeted actions on it (hidden/direct advertisers instructions, sellers, commercial content authors, i.e. purchase, registration, subscription, information resource certain page visiting, ad-link transition), to total information resource visitors amount [2]. Successful conversion is differently interpretation by authors (customer buy operation, who got interested in product by clicking on the ad), advertisers or content providers (doings, expected from visitors, for example: information resource visitors registration, mail subscription, software downloading). Internet marketing involves the use of strategies and trends of traditional direct response marketing and specialized areas of research that are applied to e-

business Internet space. Internet marketing is not only content trading, but information space, software, business models etc. [1-2]. Google, Yahoo and MSN raised Internet-advertisement market on new level and segmented Internet-advertisement market, suggesting local advertising services to e-business. Through automation of audience research ROI increases and costs are reduced. The main advantages of online marketing: interactivity, the ability to make the most accurate targeting, the ability post click analysis to maximize performance information resource conversion and ROI / ROR online advertising [1-2]. The purpose of the use of online marketing technology - getting the maximum effect of the potential information resource audience with the ability to instantly obtain sales statistics, visits, demand, etc. (Table 10) [1-2].

Search Engine Marketing (Table 11) has the following features [1-2]: work on the specific requests (keywords); relation with search (search engines, information resource search); information resource content findability increasing; context analysis (content subject, information resource subject, etc.). Usability – overall comfort rate of object using; software user interfaces development concept, oriented for maximum psychological/visual user friendliness; efficiency coefficient of menu design and information resource navigation system performance; ease of use, friendly interface and usability of the software.



Fig. 11. Internet marketing directions

Table 10. Main Internet marketing benefits

Name	Definition
Interaction	System organization principle, when aim is reached by content exchange between system elements and environment.
Search engine marketing, SEM	The process of increasing traffic from search engines, the lists of search results and advertisements.
Targeted advertising	Advertising mechanism that allows to select target audience that meets criteria to show it advertisement.
Post-click analysis	Method of Post-click marketing that maximizes efficiency and information resource conversion and ROI of online advertising.

Table 11. Main search marketing technologies

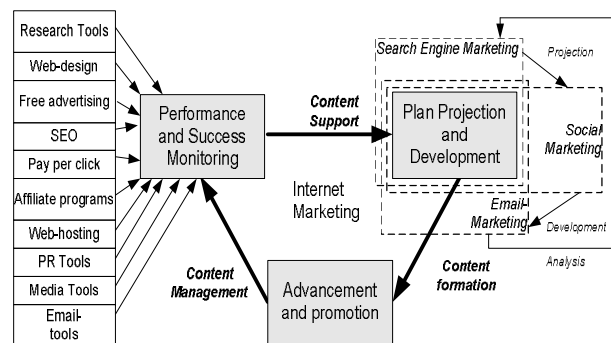
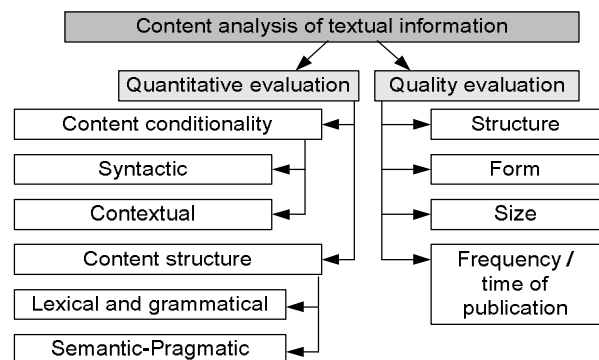
Technology	Search marketing technology appointment
Search advertising	Dissemination of information in search engines by placing ads with keywords [1-2].
Search engine optimization, SEO	The set of actions to change the state of information resource (promotion) and elements of external environment in order to obtain high positions in search results for queries [1-2].
Context advertising	Placing advertisement on thematic information resources. [1-2].

Search Engine Marketing is not reaching advertising purposes due to factors such as [2]: advertised product is not always directly reported; selling service/product is not always a purpose; difficult to increase brand awareness; impossible to bring a new product/service to market.

Result of the search engine marketing use is [1-2]: users attraction to the information resource, where for each individual case is different audience, therefore attracting wide (increasing the overall rate of information resource attendance) or interested audience; spread the content about the information resource in search engines.

The criterion for successful search engine marketing strategy chosen is the number of visitors to the information resource and conformity of resulting audience quality is predicted. A simple criterion of information resource popularity verification is external links quantity dynamics on information resource and increasing product/service or trade mark names mentioned on the Internet. The limiting case of search and contextual advertising is the placement of advertisements in information resource search results thematic. The development of the Internet contributed to the emergence of new technologies of social marketing optimization and video search marketing. Separation of search engine marketing as a separate independent strategy associated with [1-2]: continued growth of the Internet market; growth of the market for contextual and search advertising; the use of search engine optimization [1-2]; the need in content area optimal navigation and browsing, containing text, visual, animated and/or audio content and/or users experience of the system; content complex lifecycle process support that it is passing during management through various stages of publication. The process of designing and creation of e-commerce content via Internet marketing is an iterative and proceeds from analysis, design, and plan development to prototype creation and experimental tests, starting with the formation of the specifications,

layout, template creation, content formation and its position according to the structure of information resource (Fig. 12). Concentrating solutions are for business purposes and the needs of end-users. In the initial stages before determining functional requirements and development start users are joined to the process using questionnaires, alternative design and prototypes of varying degrees of readiness, i.e. collecting valuable information, causing users to feel them as a part of the design gaining their trust.

**Fig. 12.** Internet marketing for electronic content commerce systems**Fig. 13.** Text content analysis mechanism

A well-known analysis method of textual information is content analysis – standard research method in the social sciences (Fig. 13), the object of which is to analyze the content of text arrays and communication correspondence (comments, forums, emails, articles, etc.). The concept of content analysis has no unambiguous definition [2, 9, 11], so systems that are based on different approaches are incompatible. The use of content analysis of the text in the electronic commerce content systems has several advantages for simplifying business and solving a number of problems faced by participants in business processes, namely: user content filtering on information resource; the ability to automatically create a “portrait” of permanent user by analyzing his comments; the ability to automatically create a “portrait” of the target audience by analyzing the “portraits” of regular users; reduce the number of information resource moderators in ECCS; reducing the time for posting content to information resources through its automatic processing, not moderators; elimination of the language barrier through automatic creation of dictionaries and regular user automatic translation.

Most definitions of content analysis are constructive, i.e. procedural. Due to different initial approaches they generate different algorithms, which sometimes contradict each other. Existing various approaches to content analysis understanding are criticized [11]. The biggest doubt is ignoring the role of context, but the practical value of the method avoids many contradictions. Combining tools and methods and natural selection by repeated evaluation of the results make it possible to select or confirm knowledge and actual power/usefulness of the tools. Thus, content analysis – a quantitative and qualitative analysis of numerous texts for further meaningful interpretation of the quantitative and qualitative patterns. *Content analysis* used in the study of sources invariant in structure / content and existing as no systematic randomly organized text [2, 9, 11]. *The method of content analysis* is to build on the diversity of the text content of an abstract model of content. There are two methods of content analysis: quantitative and qualitative. In the study of the mechanisms of generating text in [9] found that the choice of models describing the content depends on the construction of probabilistic-linguistic testing and selection of some of its units. Simulation of the text and its components is the first step to describe the features of its linguistic units. Analysis of the language via probabilistic text modeling based on methods of quantitative linguistics, probability theory, mathematical statistics, information theory and combinatorics. In linguistic studies, such as content search [9], there are challenges, associated with the prediction of the emergence of a segment of a given length of a number of relevant classes’ word forms/phrases. Modeling text, compositions, phrases, and grammar classes determines sample size that is required to provide with a certain probability of appearance at least once relevant linguistic

unit [9]. Quantitative assessment of meaningful information in the text, words and phrases are based on the value of syntactic information and contextual conditioning [9]. Hypotheses about the most probabilistic extension text built on the basis of two types of combinatorial restrictions: combinatory figures (letters and syllables) and combinatory signs (morphemes, words, phrases) [9]. At the fifth text symbol step combinatory of letters and syllables are suppressed by restrictions that related to the compatibility of morphemes and words. When deploying text on word combinatorics restrictions are piling with combination of phrases and sentences, limitations associated with combinatorics paragraphs, sections of the content. When guessing letters far enough from the beginning of the content is located, basing not on static letters and syllables combinatorics, but on meaningful (lexical and grammatical) text building. If the text removed from the initial portion of content serves as a quantitative assessment of the distribution and statistics of letters, the syntactic information from remote sites from the beginning of content serves as a reflection of the content (semantic-pragmatic) information. These considerations make it possible to offer content analysis method for quantitative evaluation of the content and information content segments.

Content tone determination based on text analysis is harder than spam detection. Finding spam considers two hypotheses (spam, not spam), determining tone requires emotional tone check (positive, negative, neutral) and their combinations. In Bayesian method for spam detection base assessments are used - two buildings content, one of which is made up of spam, and the other - no [7-8]. For each content count frequency of each word and weighted score is from 0 to 1, i.e. the conditional probability that the content of this word is spam [7-8]. Weights value close to $\frac{1}{2}$, not taken into account while integrated calculating, so words with such weights are ignored and deleted. On detecting new events from the stream of content, which series to the input ECCS from scanning tools or content router and choused by thematic query, new events are revealed, described in content [7-8]. Plot strings of similar content are formed for them. Content, which represents new event, is interdependent content cluster base (Table 12) [7-8].

Main ECCS management tools is *content management system* [1-2]. CMS has to match certain set of requirements (Fig. 13). Usually such systems are used for saving and publishing huge content amount (documents, pictures, music, video etc.). Similar CMS allow managing textual and graphic filling, giving to user convenient information saving and publishing tools.

CMS do not support all content flow lifecycle and do not solve main information resource processing problem – content support and formation [1-2]. Main CMS disadvantage is connection absence between incoming information, content and output information. CMS are often used to builds ECS and ECCS (Table 14) [1-2].

Table 12. New event detection processes

Author	Stages of new process detection
G. Salton	1. First reviewed content is associated with first cluster. Each class shown as terms vector (keywords), which are included in clusters content. Normalized or approximated by certain criterion terms vector is centroid. 2. Each next content is compared with available clusters centroids via measure of proximity. 3. If content is close enough to certain cluster, than it is credited to this cluster, where after appropriate centroid is recalculated. 4. if content is not close to available clusters, then new cluster is formed, and new content is credited to it. 5. Content time range is an observation window. Cluster, all content of which goes outside observation window, is not considered. New event corresponds to each new cluster, shown is this cluster content.
R. Papka	1. Requests by themes formation (Text Mining is used to detect and choose notions from content). 2. New incoming content is compared with available requests. 3. If content doesn't match requests, he is associated with new event. 4. New request is added into system, which matches such content (optional).

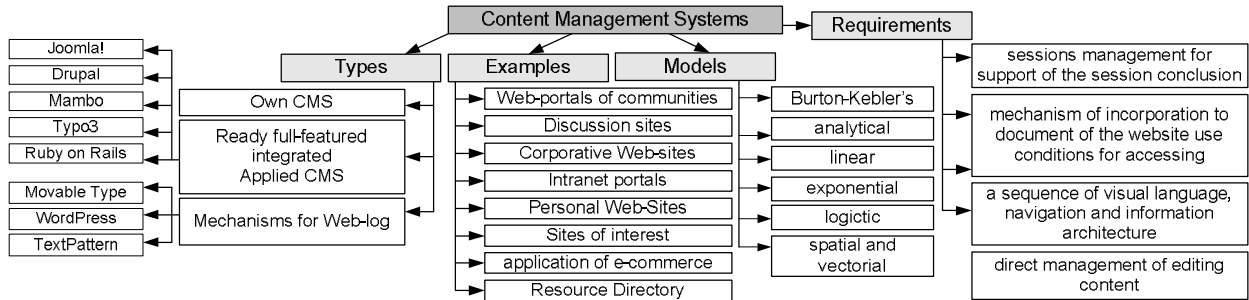


Fig. 13. Content management systems features

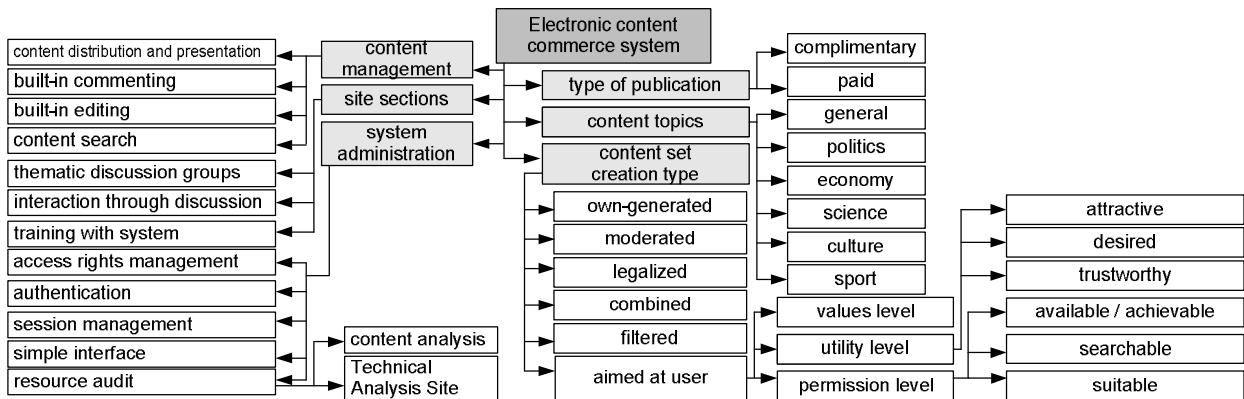


Fig. 14. Main components of ECCS

Table 13. Main content management systems characteristic ECCS, developed by [1-2]

CMS name	Software requirements			Installation simplicity	Learning curve	Session management	Users management	Extensibility	Scalability	Themes using	xHTML/CSS
	Web-server	Database	Language								
Ruby on Rails	Apache, FastCGI	MySQL, PostgreSQL, SQLite, Oracle, SQL Serer, DB2, Firebird	Ruby	+/-	+/-	+/-	+/-	+	+	+/-	+
Drupal	Apache IIS	MySQL, PostgreSQL	PHP	+/-	+/-	+	+	+	+	+	+
Mambo	Apache IIS	Apache IIS	PHP	+	+/-	+/-	+	+/-	+	+/-	+
Typo3	Apache IIS	Apache IIS	PHP	-	-	+	+	+	+	+/-	-
Movable Type	Apache IIS, Jetty, Tomcat	Apache IIS, Jetty, Tomcat	Perl	+	+/-	-	+/-	+/-	+	+/-	-
Word Press	Apache, mod_rewrite	Apache	PHP	+	-	-	+/-	+/-	-	+/-	+
Text Pattern	Apache	Apache	PHP	+	-	-	+/-	-	-	+/-	+
Joomla!	Apache	MySQL	PHP	+	+	+	+	+	+	+	+

Table 14. Main content management components, developed by [1-2]

Name	Content management system characteristics
Menu items	Addition, editing, information resource of any level menu items management.
Articles	Addition, editing, planning and articles publication (information resource pages).
News	Addition, editing and news publication.
Photo gallery	Possibility of galleries with under galleries work, automatic photo zooms.
Notice board	Adverts with photo, description and contact details addition.
Settings	All settings of information resource and his management system storage.
Users	Rights management of registered users.
Catalogue of companies	Addition, editing, publishing in under groups of any inset.
Survey	Addition/editing of surveys, results as graphs.

Web Content management system, WCMS is a tool (Table 13) for modeling information resource branched structures in ECCS and managing their content [1-2] without having special technical programming skills or html-layout. WCMS is developed for content generation in applications with such problems as dynamic gathering, content caching, safety etc. [1-2]. CMS provides control on access information resource and alteration and designed to simplify as much as possible information resource management process while keeping setting and control flexibility. Main information resource components in CMS showed in Table 14.

Content value determines his appeal for user. Content integration makes information resource attractive and application integration – useful. CMS using do not require software installation. Browser is used for editing and administrating. Intuitive system interface i and work simplicity facilitates information resource management and lowers further spending on his support. CMS includes such possibilities: fast update and content search in information resource; data collection about clients and potential clients; surveys formation and editing; information resource visiting analysis.

CONCLUSIONS

Made an analysis of commercial content formation methods, popular content lifecycle models were researched and content management services standardized, which gives possibility to determine requirements for creating optimal commercial content lifecycle. Researched Internet technologies for construction of service oriented electronic commerce system, what gave possibility to classify electronic commerce systems and electronic content commerce systems. In detail information resources and production processes of electronic commerce systems, what gives possibility to develop optimal content lifecycle and typical electronic content commerce system architecture is reviewed. Analyzed content management technology in electronic commerce, what gives possibility to develop formal models, unified methods and software information resources processing in electronic content commerce

systems. From system approach position made an analysis of modern methods and tools of electronic content commerce systems designing, modeling and realization, also justified necessity and feasibility of unified methods and information resources processing software creation.

REFERENCES

1. **Bereza A., Kozak I. and Levchenko F. 2002.** Elektronna komertsiya. KNEU, 326. (in Ukrainian).
2. **Berko A., Vysotska V. and Pasichnyk V. 2009.** Electronic content commerce systems. Lviv: NULP, 612. (in Ukrainian).
3. **Bolshakova E., Klyshynskyy E., Lande D., Noskov A., Peskova O. and Yahunova E. 2011.** Automatic processing of texts and computer linguistics. Moskva: MYEM, 272. (in Russian).
4. **Braychevskyy S. and Lande D. 2005.** Modern information streams. Journal of Scientific and Technology info № 11, 21–33. (in Ukrainian).
5. **Clifton B. 2009.** Google Analytics: professional attendance analysis web sites. Moskva: Williams, 400 p. (in Russian).
6. **Korneev B., Gareev A., Vasjutin S. and Reich W. 2000.** Databases. Intelligent processing of information. Moskva: Nolidg, 352. (in Russian).
7. **Lande D., Furashev V., Braychevskyy S. and Grigoriev A. 2006.** Modeling and evaluation electronic information streams fundamentals. Kyiv: Engineering, 348. (in Ukrainian).
8. **Lande D. 2006.** Fundamentals of information streams integration. Kyiv: Engineering, 240. (in Ukrainian).
9. **Vysotska V., Sherbyna Y., Pasichnyk B. and Shestakevich T. 2012.** Mathematical linguistics. Lviv: "Novy Svit – 2000", 359.
10. **Sovetov B. and Yakovlev S. 1998.** Systems Modeling. Moskva: VSH. (in Russian).
11. **Fedorchuk A. 2005.** Content Monitoring information flows. Nat. Acad. Science Problems. Functioning, Trends of development. Vol. 3. Available online at: <http://www.nbu.gov.ua/articles/2005/05fagmip.html>.
12. **Golota Y. 1998.** Logika antonimov i nechetskaya logika: skhodstva i razlichiya. International Conference on Soft Computing and Measurement. Saint Petersburg, 208–210. (in Russian).
13. **Grinyaev S. 2001.** Nechetkaya logika v sistemah upravleniya. Kompyuterra-Onlayn No 38 (415). Available

- online at: <<http://www.computerra.ru/offline/2001/4>>(in Russian).
14. **Zade L. 1976.** Ponyatie lingvisticheskoy peremennoy i ego primeneniye k prinyatiyu resheniy. Moskva: Mir, 165. (in Russian).
 15. **Pospelov D. 1986.** Situatsionnoye upravleniye: teoriya i praktika. Moskva: Nauka, 288. (in Russian).
 16. CM Lifecycle Poster. **Content Management Professionals. 2010.** Available online at: <<http://www.cmprosold.org/resources/poster/>>(in Russian).
 17. **EMC, IBM and Microsoft. 2008.** Content Management Interoperability Services. Appendices. Version 0.5. Hopkinton, 17.
 18. **EMC, IBM and Microsoft. 2008.** Content Management Interoperability Services. Part I. Version 0.5. Hopkinton, 76.
 19. **EMC, IBM and Microsoft. 2008.** Content Management Interoperability Services. Part II – REST. Version 0.5. Hopkinton, 79.
 20. **EMC, IBM and Microsoft. 2008.** Content Management Interoperability Services. Part II – SOAP. Version 0.5. Hopkinton, 37.
 21. **Hackos J. 2002.** Content Management for Dynamic Web Delivery. Hoboken: Wiley, 432.
 22. **Halvorson K. 2009.** Content Strategy for the Web. Reading : New Riders Press, 192.
 23. **McGovern G. and Norton R. 2001.** Content Critical. Upper Saddle River: FT Press, 256.
 24. **McKeever S. 2003.** Understanding Web content management systems: evolution, lifecycle and market. Industrial Management & Data Systems (MCB UP), № 103 (9), 686–692.
 25. **Nakano R. 2002.** Web content management: a collaborative approach. Boston: Addison Wesley Professional, 222 .
 26. **Osgood C. 1952.** The nature and measurement of meaning. Psychological Bulletin, 49, 197–237.
 27. **Papka R. 1999.** On-line News Event Detection, Clustering, and Tracking : thesis for the degree doctor of philosophy. Amherst: Massachusetts University, 154.
 28. **Woods R. 2010.** Defining a Model for Content. Available online at: < http://www.contentmanager.net/magazine/article_785_defining_a_model_for_content_governance.html>.
 29. **Rockley A. 2002.** Managing Enterprise Content: A Unified Content Strategy. Reading: New Riders Press, 592.
 30. **Stone W.R. 2003.** Plagiarism, Duplicate Publication and Duplicate Submission: They Are All Wrong! IEEE Antennas and Propagation, Vol. 45, № 4, 47–49.
 31. **Sullivan D. 2002.** Invisible Web Gets Deeper. Search Engine Report. Available online at: searchenginewatch.com/sereport/article.php/2162871.
 32. The Content Management Possibilities Poster. **Metatorial Services, Inc. 2010.** Available online at: <<http://metatorial.com/pagea.asp?id=poster>>.
 33. **Lytvyn V. 2013.** Design of intelligent decision support systems using ontological approach. Econtechmod: an international quarterly journal on economics in technology, new technologies and modelling processes. – Lublin–Rzeszow, Vol. II, No 1, 31–38.
 34. **Lytvyn V., Semotyuk O. and Moroz O. 2013.** Definition of the semantic metrics on the basis of thesaurus of subject area. Econtechmod: Lublin, Rzeszow, Vol. II, No 4, 47–51.
 35. **Vysochina M. 2014.** The innovative approach to the study of decision-making in the context of the specific character of a product of managerial work. Econtechmod: Lublin, Rzeszow, Vol. III, No 2, 87–92.
 36. **Rybytska O. and Vovk M. 2014.** An application of the fuzzy set theory and fuzzy logic to the problem of predicting the value of goods rests. Econtechmod: Lublin, Rzeszow, Vol. III, No 2, 65–69.
 37. **Fedasyuk D., Yakovyna V., Serdyuk P. and Nytrebych O. 2014.** Variables state-based software usage model. Econtechmod: Lublin, Rzeszow, Vol. III, No 2, 15–20.
 38. **Ryshkovets Yu. and Zhezhnych P. 2013.** Information model of Web-gallery taking into account user's interests. Econtechmod: Lublin, Rzeszow, Vol. II, No 3, 59–63.