Application of Online Marketing Methods and SEO Technologies for Web Resources Analysis within the Region

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Abstract

This article presents the content analysis methods for information Web resources within a particular region. The model describes content analysis for processing Web resources in online marketing and simplifies the content automation management technology. The main problems of semantic and syntactic content analysis and functional services for textual content management are analysed. The rapid growth of Internet and e-business facilitates the publication and moderation of articles, which offers an intelligent system of marketing decisions to distribute content from a specific region to a particular target audience. The article describes developing information technology for processing Web resources of e-commerce based on online marketing and SEO methods. A new approach to the e-business processes application and implementation to such intelligent systems building is formulated. Processing content and information resource methods based on SEO technology and online marketing are described. Software for content and information resource processing is developed.

Keywords 1

Content, business process, management system, SEO-technology, Google analytics, targeting, information resource, content management, typical regional information resource, search engine, internet marketing, search engine marketing, content analysis, content management system, conversion path, conversion rate, attribution model, content management interoperability service, direct marketing, target audience, web content management, web site, commerce content system, processing information resource, e-commerce content, post-click analysis, formal content management model, content creation

1. Introduction

Available content management technology is online marketing with Public relations, information management, Internet integration, customer service and sales in various fields [1-4]. *Online marketing* utilizes all essentials and aspects of traditional marketing in conjunction with new research methods (e.g., viral marketing) and information analysis using modern IT [5-9]. These relatively constant contact with users are effective thanks to the automatic tracking of statistics, which uses the Return on Investment (ROI), Rate of Return (ROR) and visitor efficiency to analyse or convert in e-commerce. The primary

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purpose of online marketing is to get the maximum effect from the potential audience of the site with the ability to demand, sales, and visits statistics, etc. [10-12].

2. Related works

Online marketing involves using strategies and areas of traditional marketing and the particular regions of research that apply to the Internet space e-business (Fig. 1, Table 1). Online marketing is not only content trading but also e-business models, software, content spaces, etc. [1-4]. Google, Yahoo, and MSN have taken it to the next level and segmented the online advertising market by offering e-commerce in-house advertising services. Due to the automation of the audience research process, the return on investment is increasing, and costs are decreasing. The online marketing advantages: the possibility of the most accurate targeting (Table 2-4), interactivity, the opportunity of post-click analysis to maximize website conversion rates and ROR/ROI of online advertising [1-4].

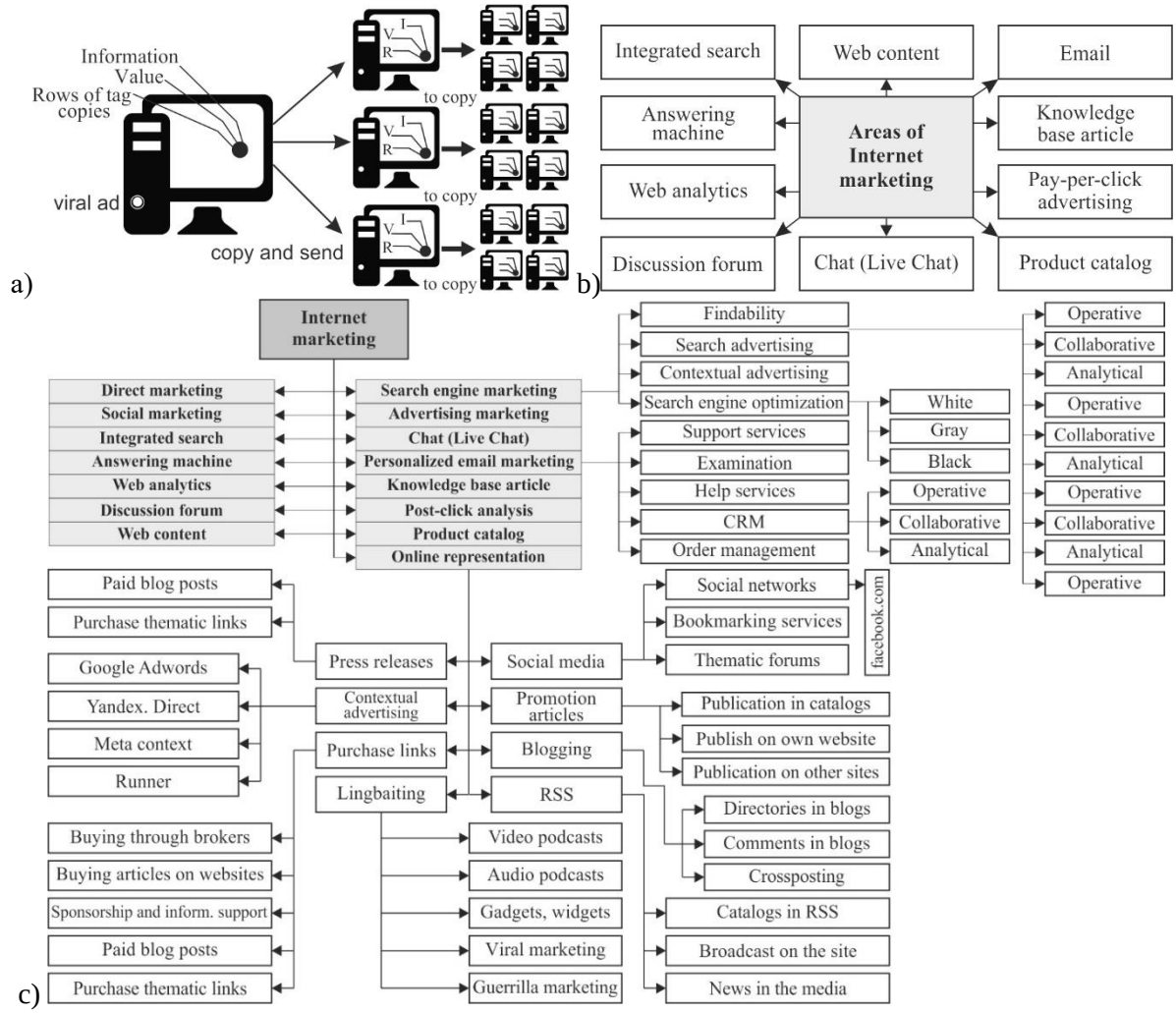

Figure 1: a) Viral marketing; b) basic directions of Internet marketing; c) areas of Internet marketing

Table 1
Areas of influence of Internet marketing

Name	The result of the impact of Internet marketing
Musical industry	In the music industry, many consumers have started buying and downloading MP3 music over the Internet instead of buying a CD
Banking case	Online banking is convenient for the customer because it eliminates the need for him to visit the bank or its branches each time

Auctions	Online auctions have gained popularity. Unique things found in flea markets are now on sale at online auctions such as eBay and more. Auction development has dramatically influenced the prices of unique and antique items.
Advertising market	The impact on the advertising industry has been and still is enormous. Over the years, online advertising has grown steadily, reaching tens of billions of dollars a year. Advertisers have begun to change their priorities actively, and today online advertising already occupies a significant market niche.
Market portable devices	It increases the volume and geography of portable electronic devices (mobile phones, players, etc.) using modern marketing methods to promote the product to the Internet market.
E-commerce content	Increase the volume, shorten the cycle of production/sale of intangible goods, and provide relevant services.
Internet sites	Online shopping sites have long ceased to be bulletin boards, some of which have become large corporations that provide a range of marketing services. Prices for participation in such venues (privileged membership) are also increasing, despite their increasing number.

Site conversion is the ratio of the number of visitors to the site. It is who completed the targeted actions (hidden / direct instructions from advertisers, sellers, content formation, visits a particular page of a site, passing through an advertising link), to the total number of visitors site [1-9].

Table 2
Basic Elements of Internet Marketing

Name	Definition
Product	An object sold via the Internet through a Web site; has its price and decent quality, is in demand, competes with similar things of other Web sites and traditional stores.
Price	Controlled quantitative indicator of the cost of goods with the following properties: much lower than in a regular store due to cost savings; regularly compared to prices for similar competing products.
Promotion	A set of methods of promoting the site on the Internet and goods, which includes a vast arsenal of tools (search promotion, contextual advertising, banner advertising, e-mail marketing, affiliate (affiliate, English. Affiliate) marketing, viral marketing, hidden marketing, interactive advertising, work with blogs and more
Place	Point of sale (Web site), where graphic design and usability play a significant role, the usability of the site, quality of processing applications from the site, speed of loading, work with payment systems, terms of delivery, work with customers before, during and after the sale.
Marketing Trends	Processes aimed at creating/increasing demand and achieving e-business goals through Internet technologies to maximize customer/product needs.

Table 3
Areas of Internet Marketing

Name	Characteristic
Display advertising Media advertising or banner advertising	An effective way to promote (increase visits) and a powerful tool to improve the image of website owners. Static/animated image ads (often Web-banner size 468 × 60 pixels), linked via a hyperlink from the advertiser or a page with more information. Together with content advertising is one of the significant formats of advertising on the Internet. Classic Web Banner - A GIF, SWF or JPG image file with static/animated image. Web banners are also created using Flash or Java technologies. Unlike traditional (bitmap) graphics, they use vector graphics to

	implement animation and sound effects at a small size, increasing the banner's effectiveness as an advertising medium.
Post-click marketing	An effective way to increase sales and marketing results by focusing on website visitors who are responsive to Internet marketing activities (pay per click advertising, HTML email, search to increase conversions)
Target - goal	The advertising mechanism (Table 4) isolates from the entire existing audience only the part that meets the set criteria (for example, the target audience) and shows the advertisement to it.
Content-targeted advertising	The advertising principle focuses on the website content, either manually or automatically as a banner or text ad. The most robust contextual advertising - Geo-Targeting, to choose geographic display pages. Show time frame limits are also applied.
Search engine marketing, SEM	A set of measures is aimed at increasing search engine traffic. Previously, the search result meant only links to relevant pages (usually on the left side of the page). Now they include advertisements on the right side of the page. Most search engine technologies do not allow you to achieve your advertising goals: they do not always directly report the advertised product or service; do not continuously pursue the purpose of sale; with their help, it is challenging to raise brand awareness; it is not possible to bring a new product to the market. The results of using any search engine technology can be two: attracting users to the site, and for each case, the characteristics of that audience are different; disseminating information about your site or business to search engines.
Social media optimization, SMO	Optimization for social media, a set of purely technical measures aimed at transforming the site content so that it can be used as simply as possible in online communities (forums, blogs)
Social Media Marketing, SMM	Promoting or promoting anything in social media (blogs, forums, online communities)
Direct marketing using the e-mail, RSS and more	A type of marketing communication is based on direct personal communication with the recipient (B2C consumer or B2B client) to build relationships and profit. Direct marketing is based on the attitude towards the client as an individual, provides feedback and does not use information brokers for communication. In Western marketing, direct marketing is referred to as BTL events (below the line, used instead of ATL - direct advertising), which combines promotions, Direct e-mail, exhibitions, POS and more. Direct marketing often uses direct mailing to the target audience via email, e-mail, SMS and more. Direct marketing is focused not on the target groups but individual individuals. Direct marketing activities require creating a database of clients - structured, constantly updated fresh information about individuals or legal entities and their consumer preferences and needs to further process this information and formulate a product offering that meets their needs. Databases in direct marketing are closely linked to the CRM concept of customer or customer relationship management, allowing you to consolidate all customer information and streamline all stages of customer relationships from marketing and sales to after-sales service.
Viral marketing and viral advertising	Guidelines are based on encouraging individuals to pass on a marketing message to other individuals that create the potential for exponential growth in the impact of the news. Like viruses, such techniques use every opportunity to increase the number of messages transmitted.
Guerrilla marketing	A marketing concept is that seeks to find a firm/entrepreneur in their marketing niche, refusing to compete openly with their powerful competitors, concentrating efforts on segregated areas of the front, and using non-traditional

	but effective ways to advertise and promote their products/services. Partisan marketing is characterized by flexibility and mobility, sometimes called low-budget/low-cost.
Aiming Precision marketing	A method is for increasing Internet marketing success through the technology of retaining existing customers, cross-selling and up-selling. Precision analysis and ROI / ROR e-business and conversion rate allow you to get sales statistics, demand, and more instantly. Emphasizes the relevance of commercial content that is achieved directly through the personal preferences of site visitors, the collection and analysis of users' behavioural and transactional data.

Table 4

Types of targeting

Name	Definition
Selection of advertising playgrounds	The most popular targeting type. It is done by selecting the advertising sites so that their visitors match the target audience.
Thematic targeting	Show content ads on websites that are relevant to the content.
Orientation by interests	Display advertising (contextual advertising) by the interests of visitors to the site.
Geo-targeting (geo-targeting)	Shows ads to a target audience that is restricted to a specific geographic region selected by the advertiser.
Orientation by Showtime	It allows you to limit your ad delivery by the time of day (morning/evening, weekdays/weekends), weeks, and years.
Socio-demographic targeting	Display ads that focus on a specific class of target audience: split ads by the target audience by age, gender, revenue, position, etc.
Quantity limit impressions to one to the user	It allows you to adjust the number of impressions of the advertising medium to one unique user as he interacts with the advertising platform. Most commonly used in banner ads with pay per 1000 impressions.
Behavioural targeting	The most promising direction to date is to introduce a mechanism for collecting user actions on the Internet through cookies.
Geo-dinky targeting	AlterGeo first mentioned the concept. The bottom line is that knowing about the object's movement (the exact location up to the institution where the thing is located can determine modern geo-social services. For example, AlterGeo.ru). It stops at some points, and you can represent the habits and passions of the object. For instance, if a thing goes to a beerhouse, the beer is probably interested.
Psycho-angry targeting	Also, one of the most promising areas is based on information on psychological qualities (psycho-type, society), various advertising is published. Theoretical background - Socionics.
MSB (Matrix Shop Behaviors)	The newest technology, the essence of which is: For each customer, based on the specifics of communication of their managers with clients, a behavioural matrix is created, which contains not only stereotypical models of thinking of customers in this business model, but also weighting coefficients of their importance in percentage. This detail allows you to evaluate the site's quality (structure, usability, design, the text content), not at the level of good/bad, but the group of specific figures.

Staying in touch with users is effective thanks to the automatic tracking of statistics, which uses ROI/ROR rates and Web resources conversion to analyse. The modification or performance of Web

resource visit is the ratio of the number of information resource visitors who completed the targeted activity to the total number of Web site visitors [3]. It is hidden/direct instructions from sellers, advertisers, and content creators, i.e. subscribe, purchase, sign up, visit of a particular Web resource page, and navigate to an advertising link (Table 5) [1-4].

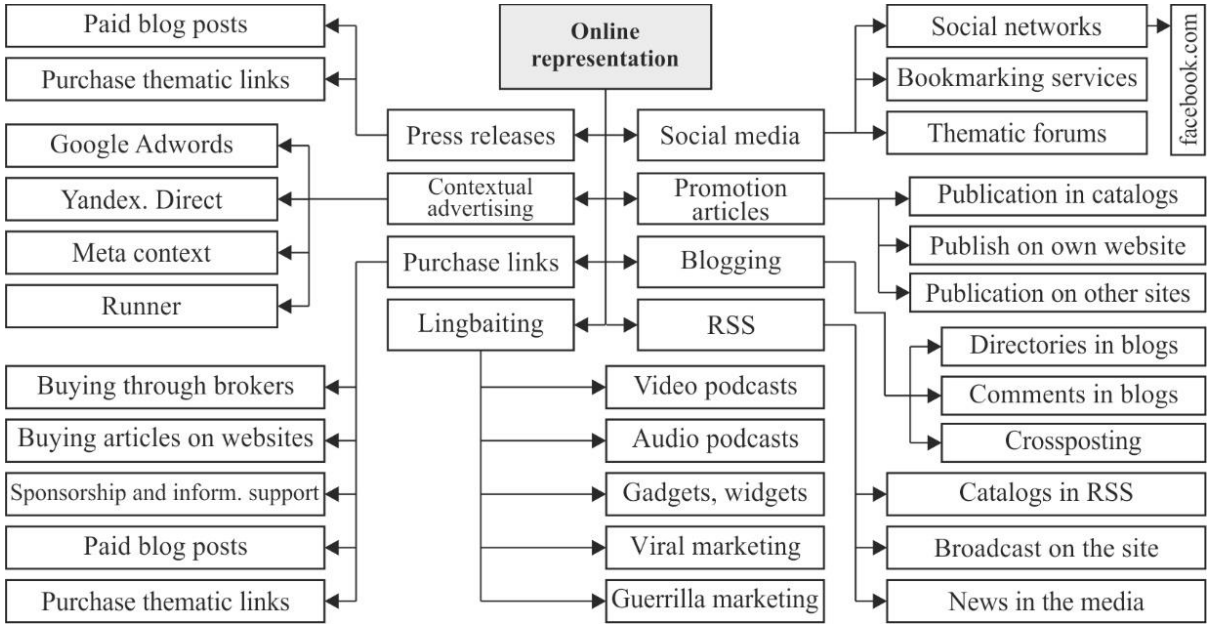

Figure 2: Main directions of Internet representation

Table 5

The online marketing advantages, developed by [1, 3 - 4]

Name	Definition
Interactivity (Interaction)	The principle of organizing a system where the goal is achieved by exchanging content between the environment and system elements
Search Engine Marketing	The increasing search engine traffic, generating search results lists and advertisements (Table 6)
Targeted advertising	An advertising mechanism allows you to allocate an information resource from the entire audience to a target resource that meets the set criteria for its advertising
Post-click analysis	A post-click marketing method that maximizes the performance and conversion of your information resource and Internet ROI

Usability user is total fertility convenience when using the object. The user interfaces development of e is focused on the maximum visual/psychological comfort; coefficient of efficiency of execution of menu design and system of navigation on the information resource; convenience and ease of use, user-friendliness, and practicality of the user interface.

Table 6

Search engine-marketing (SEM) technology developed by [1]

Technology	Purpose of search engine technology
Search advertising	Distribute information to search by placing keyword-targeted ads
Search engine optimization	Actions to change the status of an Web resource and elements of the external environment to gain high positions in search results
Contextual advertising	Advertise on thematic Web resources

SEM technology (Fig. 3, a) has following characteristics [1-4]:

- Context analysis (advertising site topics, etc.).
- Dealing with queries by specific keywords.
- Search Engagement (Website Search, Search Engines).
- Increase of the Findability content of the Web site content (Fig. 3b).

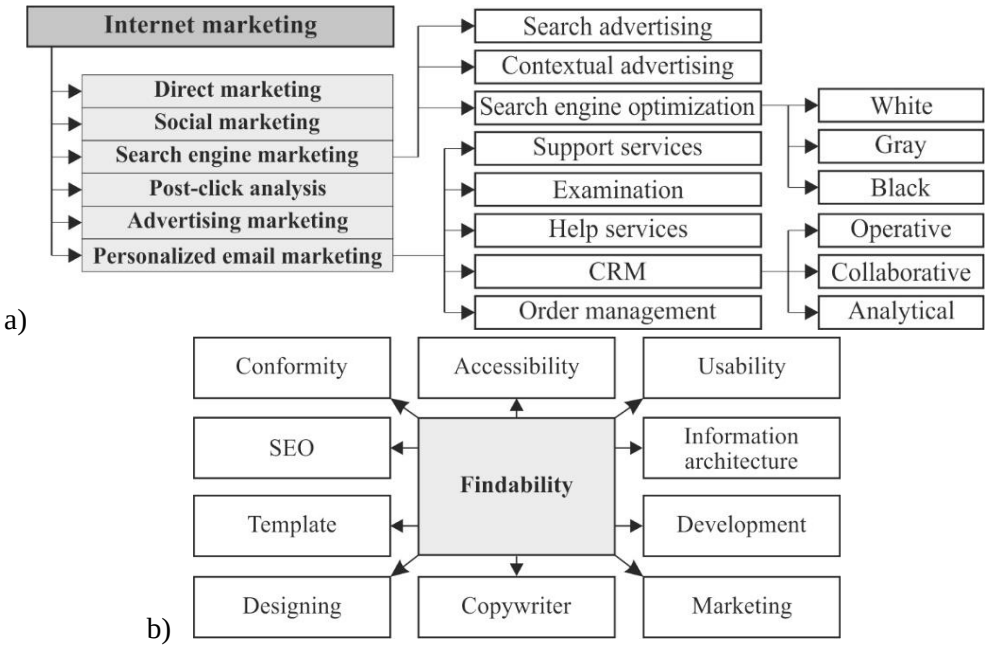

Figure 3: Technologies: a) search engine marketing and b) Findability

Usability – user is a general convenience factor when using object; the user interfaces development focused on the maximum visual/psychological convenience; menu design performance and site navigation; convenience and ease of use, user-friendliness, and practicality of the software interface. Search engine marketing does not reach advertising goals due to the following factors [3]: they do not always directly report the advertised product; do not continuously pursue the purpose of selling the product/service; with their help, it is challenging to increase brand recognition; it is impossible to market a new service /product/content.

Using SEM result is [3]:

1. Attracting users to an information resource where the audience differs on a case-by-case basis, therefore attracting a broad (increasing attendance rate of the Web resource) or an interested audience;
2. Content dissemination about Web resources in SEO.

The criterion of a successful SEM strategy is the number of visitors to the Web resource and the quality of the resulting audience. A simple measure for checking the popularity of Web resource is the dynamics of the number of external links to the Web resource and the increase in references to the name of a service/product/content or company trademark. The marginal case of SEO and contextual advertising is the placement of advertisements in the content search results of the Web resource. The development of the Internet has fostered new search engine marketing technologies for social networks (Video Marketing Marketing). The separation of search engine marketing into a separate standalone strategy is associated with [1]:

- The continued growth of the Internet market;
- The growth of the contextual / search advertising market;
- Using SEO technology [1];
- The need for optimal surfing/navigation in content;
- Supporting the complex content lifecycle process it goes through while managing the various stages of publishing.

The process of designing and creating an electronic content commerce systems (ECCS) based on the results of online marketing is iterative and proceeds from analysis, design, plan development to prototype creation and experimental testing, starting with the specification, layout, template creation, content formation, and content according to the structure of the information resource (Fig. 4).

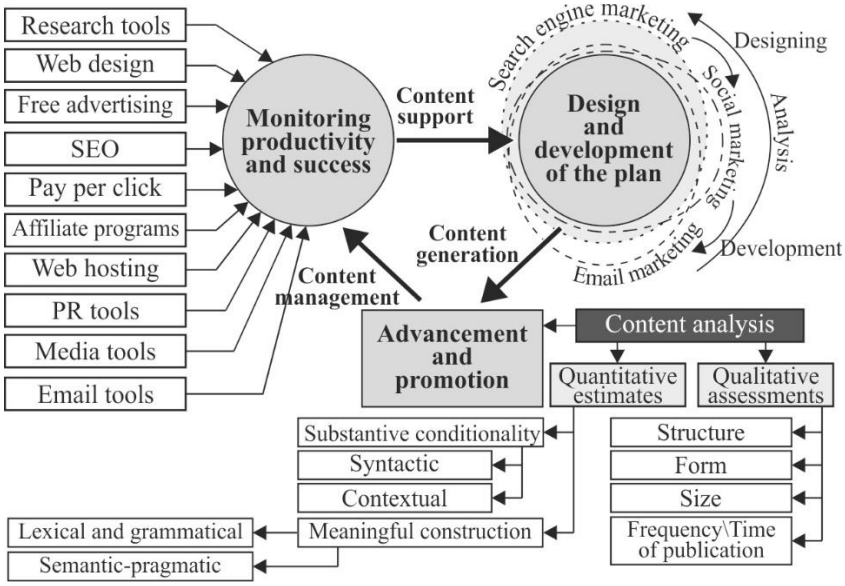

Figure 4: Internet marketing for e-commerce content systems

Concentrate on end-user business goals and needs. In the initial stages, users are connected to the definition/development of functional requirements using survey letters, design alternatives, and prototypes of varying degrees of readiness. They collect valuable information, giving users a sense of direct involvement in the design process and gaining their trust.

A well-known method of analysing textual information is *that content analysis is a standard research method* in the social sciences (Fig. 42, Table 7-9). The subject is the analysis of the content of text arrays and communicative correspondence (comments, forums, electronic mail, articles, etc.). The concept of content analysis is not uniquely defined [4], so systems built on different approaches are incompatible. Applying the content analysis to e-commerce content systems offers several benefits for simplifying your business and resolves some problems facing business process participants, namely:

1. Filtering user content on an information resource;
2. The ability to automatically create a portrait of a regular user based on the analysis of his comments;
3. The ability to automatically create a "portrait" of the target audience based on the analysis of "portraits" of regular users;
4. Reducing the number of moderators of the information resource in the ECS;
5. Reducing the time for posting user content on an information resource due to its automatic processing, not by moderators;
6. Elimination of the language barrier due to the automatic formation of dictionaries of regular users and automatic translation.

Table 7
Ambiguous definitions of content analysis

Author	Definition
D. Jerry, JJ. Jerry	The method of objective qualitative and systematic research of the content of communication media
D. Mannheim, R. Rich	Systematic quantitative elaboration, evaluation, and interpretation of the form and content of the information source

V. Ivanov	The qualitative and quantitative method of document research (characterized by the objectivity of conclusions and rigour of the procedure) and quantitative processing of the text further interprets the results. The subject of the study - the problems of social reality, which are expressed and hidden in the documents, and the internal laws of the object of study
B. Krasnov	It consists of searching in the text definite meaningful concepts (units of analysis), identifying the frequency of their appearance and correlation with the content of the whole document
E. Tarshish	Research technique for obtaining results by analysing the content of the text about the state and properties of social reality

Table 8

The main components of content analytic research

Name	Properties of the main components of content analytic research
Observation	Elaboration of the mass of texts, using the typical sociological procedures of continuous/selective observation, with the observance of representativeness requirements
Structuring	The assumption of structuring, segmentation, dismemberment of texts or the separation of meaningful invariants (repetition in all / several texts) in the studied mass population
Formalization	They ensure the uniformity of segmentation and isolation of invariants, application of a high degree of formalization, strict operating rules and formal algorithms in analytical procedures
Abstracting	Formalized separation of whole texts or selection of individual elements for subsequent collection using the analytical and synthetic procedures
Analysis	Use of probability theory and mathematical statistics methods for text processing.

Table 9

Types of content analysis methods

Name	Quantitative (meaningful)	Quality (structural)
Definition	A study of words, topics, and messages that focuses on content.	A study that examines not its content but its form and structure
Example	As a first step, the researcher should create a dictionary in which each observation will identified and assigned to the appropriate category.	Determining the period or amount of print space that is assigned to a topic in a given source, or how many words or columns are allocated to each topic in the appropriate category.
Feature	Before analysing the selected linguistic units, predict their content (create a dictionary) and determine each possible observation result by the researcher's expectations.	The specific weights of P each topic and category are calculated ($P = R/T$, where R is the number of units of this category, T is the total number of units) and a comparative analysis of the relevant topics is carried out to further predict events, processes.

Most definitions of content analysis are constructive, that is, procedural (Table 7). Due to different initial approaches, they generate different algorithms, which are sometimes contradictory [1]. The most questionable is the neglect of the role of context (Table 8). The practical importance of the method avoids many contradictions. Rev ' union means, and methods of natural selection and repeated evaluation of the results obtained provide the opportunity to release or confirm factual knowledge and power/utility toolkit (tab. 9). Content analysis is a quantitative and qualitative analysis of text arrays for further meaningful

interpretation of the obtained quantitative and qualitative patterns. The method is to create from a variety of text an abstract model of content. It is used to analyse sources invariant by structure/content in the form of unsystematic, disorderly organized text [1].

The content analysis of commercial text content is used to determine the tone of the text, duplicate content, and spam and identify new events to identify thematic plots of text content.

Content analysis is used to study sources invariant in structure/content and existing as non-systematic, disorderly organized textual material [6]. *The method of content analysis* is to form from a variety of text material abstract models of the text's content. There are two methods of content analysis: *quantitative* and *qualitative*. In a study of the mechanisms of generating textual information, it is found in [6] that the choice of a text description model depends on constructing a probabilistic linguistic test and organizing the selection from the text of its units. Probabilistic modelling of textual information and its components is an introductory, preparatory stage for describing the functions of linguistic units in the text. The study of language and speech functioning through probabilistic modelling of content relies on quantitative linguistics, probability theory, mathematical statistics, information theory, and combinatorics. In linguistic studies, especially during the implementation of content search algorithms [6], there are constant problems associated with predicting the occurrence of a certain number of word-forms/phrases in specific classes in a segment. Probabilistic modelling of text and syllables, word combinations, grammatical categories allows determining the sample required to provide the corresponding linguistic unit [6]. Quantitative evaluations of content information in text, words, and phrases (Fig. 5, a) are obtained based on the meaning of syntactic information and using the idea of contextual conditioning [6].

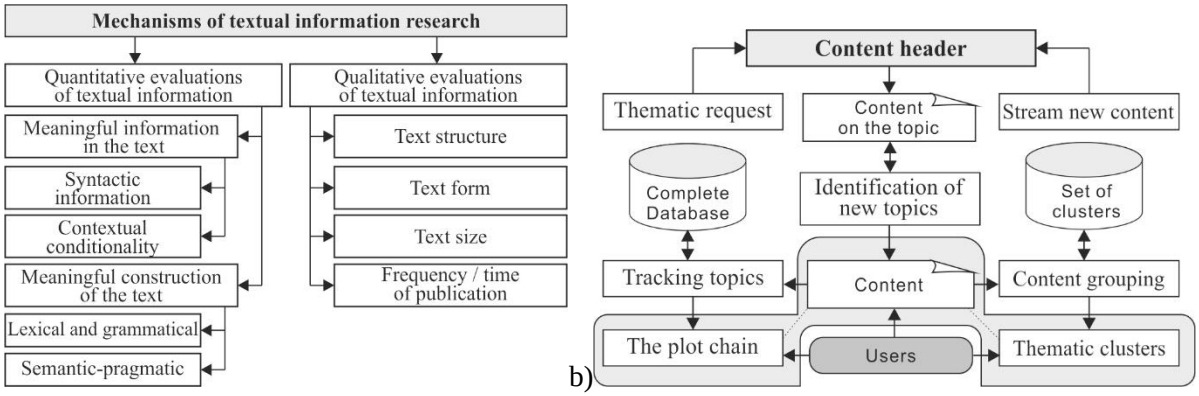

Figure 5: Mechanisms a) research and b) content formation

During the experiment of guessing letters of unknown text in work [6], it was noticed that the participants of the investigation make their hypotheses about the most probable continuation of the text, based on two types of combinatorial constraints: combinatorics of figures (letters and syllables) and combinatorics of signs (morphemes, words, words). The experiment shows that even at the fourth or fifth letter steps, the combinatorics of letters and syllables are suppressed by the constraints related to the compatibility of morphemes and words. As the text is expanded, word combinations are compounded with word combinations and sentences, and restrictions associated with the combinatorics of paragraphs, chapters, book sections, or articles appear. Thus, when guessing letters located at a sufficient distance from the beginning of the text, the experiment participant relies not on the statistical combinatorics of letters and syllables but on the text's meaningful (lexical-grammatical) construction. Suppose the content removed from the original text section acts as a quantitative assessment of the distribution (distribution) and letter statistics. In that case, the syntactic information obtained from the outer areas of the text serves as a reflection of meaningful (semantic-pragmatic) information. These considerations make it possible to propose a content analysis method for quantifying meaningful information in text and its segments. In identifying new events, stream content consistently to the input ECCS using scanning or content router and thematically selected results (Fig. 5, b) identify new developments in the content description [2, 8]. For them, they form story chains of similar content [8-10]. Content that reflects new events is the basis of interdependent content clusters (Table 10) [11-13]. Each set can be the basis for the formation of a complete story chain.

Table 10

Processes for detecting new events [11-13]

Author	Stages of discovering new events
G. Salton	1. The first content under review is the first cluster. Each cluster is represented by a vector of terms (keywords) included in the content of that cluster. The term vector, normalized in some way, is a centroid. Sometimes centroid is content that is closest in some measure to the term vector of a given cluster, which does not change the essence of this algorithm [11-12]. 2. Each subsequent content is compared to the centroids of the existing clusters (some degree of closeness is introduced). 3. If the content is closed enough for some cluster, it is attributed to that cluster, after which the corresponding centroid is enumerated. 4. If the content is not close to the existing clusters, then a new set is formed to which such content is attributed. 5. The time range of the content under consideration is commonly referred to as the "observation window". Clusters whose entire content is outside the observation window are taken out of the scope of review. The algorithm, as a result, every new cluster that arises corresponds to a new event reflected in the content of that cluster.
R. Papka	1. Requests for general topics are formed (using Text Mining techniques - identifying and selecting concepts from content) [13]. 2. New incoming content is compared to existing requests. 3. If the content does not respond, it is associated with a new event. 4. A new request corresponding to such content is included in the system (optional).

Determining the content tone based on text analysis is more complex than detecting spam. When seeing spam, consider two hypotheses (spam, not spam) and select the vibrant colour style (positive, negative, neutral) and their combinations. The Bayesian method uses spam databases to determine spam, two content corpses, one of which is made up of spam and the other is not [8]. For each content, the frequency of use of each word and the weight rating (0 to 1) are calculated, that is, the conditional probability that the content with that word is spam [9]. Weight values close to ½ are not considered in the integrated calculation, so talks with such weights are ignored and deleted. The hypothesis space contains the $Tonality = H_{-1}$ (negative), $Tonality = H_0$ (neutral) and $Tonality = H_1$ (positive) key. In the case of hypotheses H_1 from the set with a positive tone, choose the terms specific to this content. They choose words t with a probability calculated by Bayes formula and greater than ½. Decisions about the content tonality are made considering the difference between the values of the weighted estimates of the hypotheses H_1 and H_{-1} [9]. According to the Paul Graham method, if the content *n* contains terms with the weighted forecast $w_1,...,w_n$, then the conditional probability of spam occurrence [9-12] is based on the data from the evaluation bodies and is calculated as

$$Spm - \prod w_i / \left(\prod w_i + \prod (1 - w_i) \right).$$

If *S* is an event that is that list is spam, *A* is an event that a letter has contains the word *t*. According to Bayes' formula [9].

$$P(S \mid A) = \frac{P(A \mid S)P(S)}{P(A \mid S)P(S) + P\left(A \mid \overline{S}\right)P\left(\overline{S}\right)}.$$

To detect such content c_i and duplicate c_j, the rule of reflectivity is valid, but the condition of transitivity is not fulfilled $c_i \prec c_j, c_j \prec c_k \not\Rightarrow c_i \prec c_k$. The content is similar to the text in the mix that includes it, but the combination is not like it. Alternatively, content identical to the other two is compiled, but the originals are significantly different. For the duplication relation, symmetry and transitivity are

performed, that is, $c_i \equiv c_j \Rightarrow c_j \equiv c_i$ and $c_i \equiv c_j, c_j \equiv c_k \Rightarrow c_i \equiv c_k$. The relation of reflexivity, symmetry, and transitivity is related to equivalence [1-8], i.e. the relation of duplication. Each content c_i according to the above algorithm of coincidence of terms in signatures is assigned a vector with elements [9]:

$$a_{ij} = \begin{cases} 1, & c_i \equiv c_j, \\ 0, & \textit{інакше}, \end{cases} \text{, at } U_B = \begin{vmatrix} a_{11} \dots a_{1n} \\ \dots\dots\dots\dots \\ a_{n1} \dots a_{nn} \end{vmatrix}.$$

In the analysis of similarity criteria, the conditions of symmetry $\forall i, j : a_{ij} = a_{ji}$ and transitivity are used $\forall i, j, k : a_{ij} = 1, a_{jk} = 1 \Rightarrow a_{ik} = 1$, changing the volume of comparison terms to find the corresponding coefficients [110-111], i.e.

$$\left(\left(\sum_i^N \sum_j^N \left| a_{ij} - a_{ji} \right| \right) \Big/ \left(\sum_i^N \sum_j^N a_{ij} \right) \right) \to 0 \text{ and } \left(\left(\sum_i^N \sum_j^N \sum_k^N a_{ij} a_{jk} a_{ik} \right) \Big/ \left(\sum_i^N \sum_j^N a_{ij} \right) \right) \to \max,$$

where *N* is the amount of content. The asymmetry coefficient is associated with the definition of duplicates approximately and the transitivity level with completeness.

When new events are detected from a content stream sequentially fed to an ECCS input from a scanner or content router and selected on a thematic request, recent events are described in the content [9-15]. For them, they form story chains of similar content. Content that reflects new possibilities is the basis of interdependent content clusters [9-12]. The collection becomes the basis for the formation of the story chain $u_{t_1} = sim(c_i, Dictionary) > \alpha$, $u_{t_2} = \sum_{j=2}^{n} sim(c_i, Dictionary) > \beta$, where *n* is the volume of content flow; c_1 is current content; c_n is the latest content; c_i is *i* the content; *Dictionary* is the dictionary; $sim(c_i, c_j)$ is a measure of the content's proximity *i* to *j*; $sim(c_i, Dictionary)$ is a measure of the closeness of the content to the dictionary, α and β are empirically determined parameters [9]. If the content is a plurality of terms $c_i = \{w_{ik}\} = \{w : w \in c_i\}$, then $c_i + c_j = \{w : w \in c_i \mid w \in c_j\}$ it is the union of terms from the content c_i and c_j into a vector $E_i = \{e_{ik}\}$ of dimension *N*, which is defined as

$$e_{ik} = \begin{cases} 1, & w_{ik} \in c_i, \\ 0, & w_{ik} \notin c_i, \end{cases} \text{ that is } E = \begin{vmatrix} e_{11} \dots e_{1n} \\ \dots\dots\dots\dots \\ e_{n1} \dots e_{nn} \end{vmatrix}.$$

The proximity measure is given

$$sim(c_i, c_j) = \left(\sum_{k=1}^{N} e_{ik} e_{jk} \right) \Big/ N.$$

In [9], the proximity apparatus uses a conditional probability apparatus (the entry of some term w into the content c_i, provided that it is included in the content c_j).

To develop ECCS, a Web Content management system, CMS [1-3], if it meets a specific set of requirements (Fig. 6). CMSs do not support the entire life cycle of the content stream and do not solve the main problems of information resource development is content creation and maintenance [4]. The main disadvantage of CMS is the lack of communication between the input information, the content and the output information (Fig. 7) [14-18].

Usually, such systems are used to store and publish a large amount of content (documents, images, music, videos, etc.). Such CMSs allow you to manage text and graphics content by providing users with convenient tools for storing and publishing information. CMS is a tool (Table 11) for modelling the branched structures of information resources in the SEC and managing their content [1-13] without special technical skills such as programming or HTML layout. CMS is developed to generate content using dynamic collection and content caching, so its safety [2]. CMS provides control over access to the information resource and changes and aims to simplify managing the information resource while maintaining the flexibility of settings and management. The main components of the information resource in CMS are presented in Table 12 [14-18].

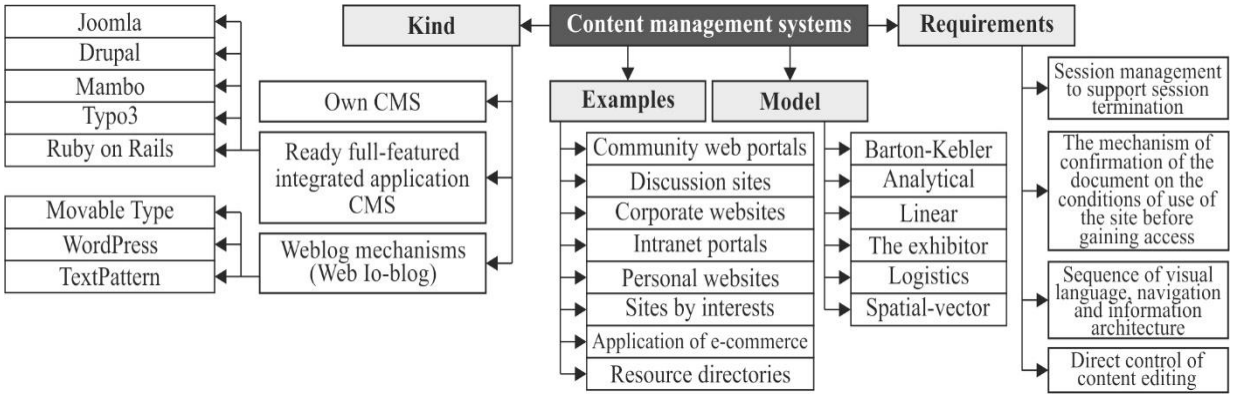

Figure 6: Basic requirements for content management systems for the construction of e-commerce content systems

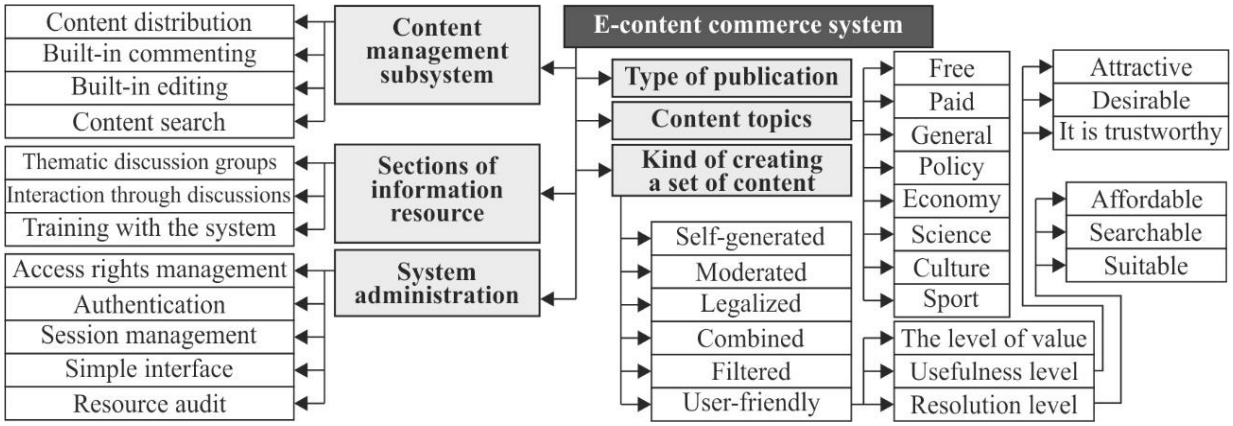

Figure 7: The main components of content management systems for the construction of ECCS

Table 11

Characteristics of major content management systems for the development of e-commerce content systems, developed by [4]

N	Name systems management content	Software Requirements			Easy to install	Learning curve	Session management	User management	Extensibility	Scalability	In use of the mes	XHTML / CSS
		Webserver	Database	Language								
1	Ruby on Rails	Apache, FastCGI	MySQL, Postgre SQL	Ruby	+/–	+/–	+/–	+/–	+	+	+/–	+
2	Drupal	Apache IIS	MySQL, Postgre SQL	PHP	+/–	+/–	+	+	+	+	+	+
3	Mambo	Apache IIS	Apache IIS	PHP	+	+/–	+/–	+	+/–	+	+/–	+
4	Typo3	Apache IIS	Apache IIS	PHP	-	-	+	+	+	+	+/–	
5	Movable Type	Apache IIS, Jetty	Apache IIS, Jetty	Perl	+	+/–	-	+/–	+/–	+	+/–	-
6	Word Press	Apache, mod_rewrite	Apache	PHP	+	-	-	+/–	+/–	-	+/–	+
7	Text Pattern	Apache	Apache	PHP	+	-	-	+/–	-	-	+/–	+
8	Joomla!	Apache	MySQL	PHP	+	+	+	+	+	+	+	+

Using CMS does not require software installation. They use a browser for editing and administration. The intuitive interface and ease of use of the system make it easier to manage the information resource and reduce its cost. [14-18]. CMS includes the following features: rapid updating and retrieval of content in an information resource; collecting customer and lead data; forming and editing polls; analysis of information resource visit. There are large streams and volumes of different content in ECCS. Most of these streams of content drawn from easily formalized and automated procedures and commercial content. However, there is no overall approach to formalizing, designing, developing and implementing the ECS. Such systems do not describe or disclose the relationships and dependencies between input data, commercial content, output data and processes of processing information resources (Table 12).

Table 12
The main components of the subsystem of processing of information resources, developed by [1-4]

Name	Feature Content management system
Menu items	Adding, editing, managing menu items of information resources of any level
Articles	Adding, editing, scheduling and publishing articles (information resource pages)
News	Adding, editing, and publishing news
Photo gallery	The ability to do photo galleries with sub-galleries, automatic photo zoom
Board	Adding ads with photos, descriptions and contact information
Settings	Storage of all settings of the information resource and its management system
Users	Management of the rights of registered users
Catalogue of companies	Adding, editing, publishing firms in subgroups of any nesting
Poll	Adding / editing polls results as graphs

The value of the content determines its attractiveness to the consumer. Integrating content makes an attractive resource and the integration of applications - useful [14-18]. Using CMS does not require software installation. They use a browser for editing and administration. The intuitive interface and ease of use of the system make it easier to manage the information resource and reduce the further costs of maintaining it. [14-18]. CMS includes the following features: rapid updating and retrieval of content in an information resource; collecting customer and lead data; forming and editing polls; analysis of information resource visit.

3. Materials and methods

3.1. Content management tools in e-commerce

Several content lifecycle models (Tables 13-14) are proposed and described by several authors with properties supported set by different technologies and processes [19-29].

Table 13
Define the term content [1-18]

Appointment	Define the term content
Algebra	For example, the common determinant of the coefficients is the value among the plurality of data (the largest, smallest, average computation time of a function).
Measurement theory	An additive function that determines the value of a field (variable)
Web content	The information published on the Internet
Media content	The published information by users, designers, or administrators of Web portals, such as audio/video/graphics.

Quantitative determinant	Volume, sphere, space, size
Applied Linguistics	System of definitions or semantics of language; subject matter/question formed in the form of a book or document; part of the language being examined, for example, content in a sentence - noun or verb; the information conveyed in a conversation and easily perceived after reading and analysing.
Formatted content	Encoded format for displaying melons, such as password hash or private/public key for network communication.
Free content	Published material that is legally protected by copyright through free licenses.
Open content	Published material free use based on creating material for publications
Mathematical Linguistics	An object that contains contextual information (explaining an area or its meaning, explaining the difference between objects)
Content table	The content of the document, for example, the contents of a scientific book or administrative document
Information Technology	The object of an information resource of predefined form; text content on the Website

Table 14
Content life cycle classification [19-29]

Author	Stages	Features of the model
McKeever Susan	collection, delivery / publication	Web Content Management has four levels of hierarchy: content, activity, output, and audience to illustrate WCM latitude [23]
Bob Boiko	collection, management, publication	The build stage is the collection, creation, and editing, management, workflows, reconciliation, versioning, archiving, syndication, metadata management [19]
Gerry McGovern	creation, editing, publication	Knowledge, content and map information are suitable for three key processes: creation, editing, publishing. Creation is an approximate definition of knowledge for a particular idea or set of ideas. Editing is the process of modifying professional content with these ideas in mind. The publication is the submission of content to the right person at the appropriate time. The creating, editing and publishing processes are required to generate content benefits. Thus, the benefits of content are described by the formula: $ContentBenefit = Create \times Edit \times Publish.$ [22]
JoAnn Hackos	creation, archiving, drafting/ combination, publication	The module covers the concept of metadata. She is deeply immersed in terms of metadata and how it should be used. Focuses is on data legalization, database searching, and information transformation into knowledge. The author gives an idea of the correspondence of information accumulation to a solid and stable information model. She describes a merger of usability ideas, information architecture, and content management in the model to focus on end-users [20].
Ann Rockley	creation, revision, management, delivery	The creation phase consists of planning, designing, authorization, and verification. A unified content strategy is a systematic method of identifying all the major content requirements to create consistently structured content, reuse, manage recognised content sources, and edit content based on user requirements and needs [26].

Russell Nakano	presentation, comparison, updates, mergers, publication	The author paid particular attention to the process of managing Web content, including collecting versions and simultaneous changes [24].
The State government of Victoria (Australia)	development, quality approval, publication, cancellation publications, archiving	The archiving stage consists of the sub-stages of accumulation, archiving, recycling. In addition, this model reflects three significant aspects of Web content flow: status, process, and role (author content, quality management content, quality management process, management records).
AIIM	capture / absorption, management, accumulation, delivery, storage	The model's focus is on the ability to organize the collection, management, storage, accumulation, and supply of the necessary information to the right people at the right time.
CMP org-tion	planning, development, management, deployment, storage, evaluation	Each stage is divided into sub-stages. For example, the planning stage consists of sub-stages of alignment, analysis, modelling, design. Stage of development - creation, collection, collecting, classification, editing [11-15].
Bob Doyle	organization, creation, accumulation, workflow, version control, publication, archiving	The model is based on the principle of seven +/- two. That is, it allows making changes (increase/decrease the number of stages) in the model itself, depending on the purpose of Internet marketing.
Woods Randy	legalization, template, creation, modification, version control, rotation, monitoring and success management	In the model, the focus is on the categories of problem-solving rather than the very stages from the initial (content creation) to final (content publishing). Most content management issues fall into one of the following categories: legal content migration, reasoning template, content creation and reuse, controlled version and site rollback, content and end rotation, process monitoring, and success management (results) [25].
Halverson	audit, analysis, strategy, classification, structuring, create, view, re-viewing, final viewing, approval, testing, formatting, publishing, updating, archiving.	This model focuses on content strategies, provides a high-level overview of the benefits, roles, activities, and outcomes associated with strategy content. Model Purpose: Web consulting, design, and industry development describes processes and methodologies applied to all types of content: text, images, video, and audio [21].

In some content lifecycle models (Table 15), project management concepts, information management, information architecture, content strategies, Web site management, and semantic printing are provided 30-38]. Different authors suggest different stages of the content lifecycle [49-54]. The main steps (content creation, development, viewing, distribution and archiving) are present in almost all proposed models [55-64]. The lifecycle of processes, actions, content status, and content management role differ in models depending on organizational strategies, needs, requirements, and capabilities [11-29].

Table 15
Content life cycle classification [19-29]

Author	No	Development of information resources		
		Formation	Management	Realization
McKeever S.	1	+/–	-	+/–
The State Victoria	2	+/–	-	+/–
Russell Nakano	3	+/–	-	+/–
Ann Rockley	4	+/–	+/–	+/–
Jo Ann Hackos	5	+/–	-	+/–
McGovern G.	6	+/–	-	+/–
Bob Boiko	7	+/–	+/–	+/–
Bob Doyle	8	+/–	+/–	+/–
CMP organization	9	+/–	+/–	-
AIIM	10	+/–	+/–	+/–
Woods Randy	11	+/–	+	+
Halverson	12	+	+/–	+/–

Web Content Lifecycle Models 1-7 do not solve the problems of content creation and implementation, and they do not solve all of the issues of managing a convention, for example:

- Submitting a plurality of content to an end-user according to their request, history or data portfolio;
- Generation of digests and user or content portraits;
- Automatic discovery of thematic subjects;
- Construction of tables of the interrelation of concepts;
- Calculation of ratings of terms;
- Collection of information from different sources and its formatting;
- Identification of keywords and concepts of content;
- Content categorization, identification of duplicate content, selectively distributing content.

Models 8-10 successfully cope with content management issues and some content generation issues but ignore content implementation issues. Models 11-12 solve content generation and content management issues and partially address content implementation issues. Not all of these models support Web 2.0-3.0 (Table 16) [66-75].

Table 16
Comparison of Web 1.0-2.0 parameters

Name	Web 1.0	Web 2.0	New properties
Actor	User developer or content creator and reader	User as co-developer, reader as co-author or partner	The right to participate; cancellation of third party regulatory side (moderation)
Software	The software was created for the PC; Software - goods; closed source codes, ARI; licensed sale;	Create software for the Web; Software - service, application; open-source, API, open-source software; The software may be	Web as a platform; removal and erosion of barriers and restrictions (free

	binding of software to equipment; focus on invention; scheduled release; use a browser to view content.	free; software over the equipment; search for applications already invented; eternal beta; alternative means of perception.	access, versatility, simplification).
Content	Database replenishment: payment to the content provider or hiring moderators; taxonomic organization of data; hierarchy of headings; data storage facilities - catalogue, library, storage; one-way links submission form - personal pages; static site; the site page has an address; the source is the mind of the content creator; menu navigation site to work with its data; copyright; to view the content, visit the site by clicking on a link or bookmark.	Database replenishment - having one becomes immediately accessible to everyone; the data is organized in a volatile manner; data usage tools - APIs; automatic two-way links submission form - blogs; dynamic site; the address has a trace element of content; the source is the collective mind; an interface for handling data across the network; "Free" GNU FDL license; content is not required to visit the site - read RSS feeds.	Network as a single collective mind, content atomization, aggregation, syndication.
Events	Software ordering and manufacturing; publication of the content by the authors and their readers' perception; appeal to a third party - a mediator to use its resources; big, not many deals.	Collaboration through the Software Support Department; interacting, adding properties, values, creating shared content with each participant; self-service based on the partner architecture of the service, which is merely an intermediary between users using their resources; small many numerous transactions.	Cooperation; amateur; single mass relationships
Value/ cost	Value in the software - the software owner makes money; The Internet is valuable as a source of information.	Value in the database - the database owner and services to work with them make money; The Internet is valuable as a communication tool.	Working with the database; service, not product; saving time and attention

A well-known content management tool is the Content *Management System* (CMS), software for organizing Websites or other Web resources or individual computer networks [1-9]. CMS must meet certain requirements set (Fig. 8). Usually, such systems are used to store and publish a large amount of content (documents, images, music, videos, etc.) [10-13]. Such CMSs allow you to manage text and graphics content by providing users with convenient tools for storing and publishing information. In Fig. 8, b is a CMS classification [14-18]. CMSs do not support the entire content lifecycle and do not solve the main problems of Web resource development - content generation and implementation. The main drawback of CMS is that there is no link between the input, content, and output. CMS is often used for the construction of SEC and ECCS (Table 17-20), such as online newspapers (Fig. 9, a) [14-18]. Web Content management system, WCMS developed to generate content within portals with the same problems (dynamic collection, caching content, security, etc.) and other Web applications [76-83]. The

value of the content determines its attractiveness to the consumer [84-99]. Content integration makes portals attractive and application helpful integration. As users are increasingly drawn to portal applications, there are more and more applications, including ECM. The WCMS admin panel allows you to change/add new information for different language versions of the Web site [100-112]. Changes to the site are displayed immediately after making and saving.

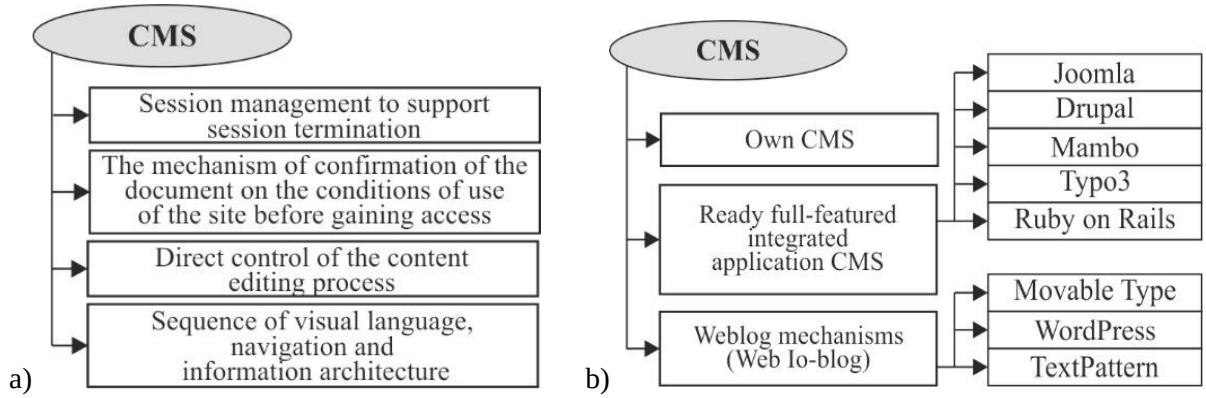

Figure 8: a) Requirements and b) CMS classification

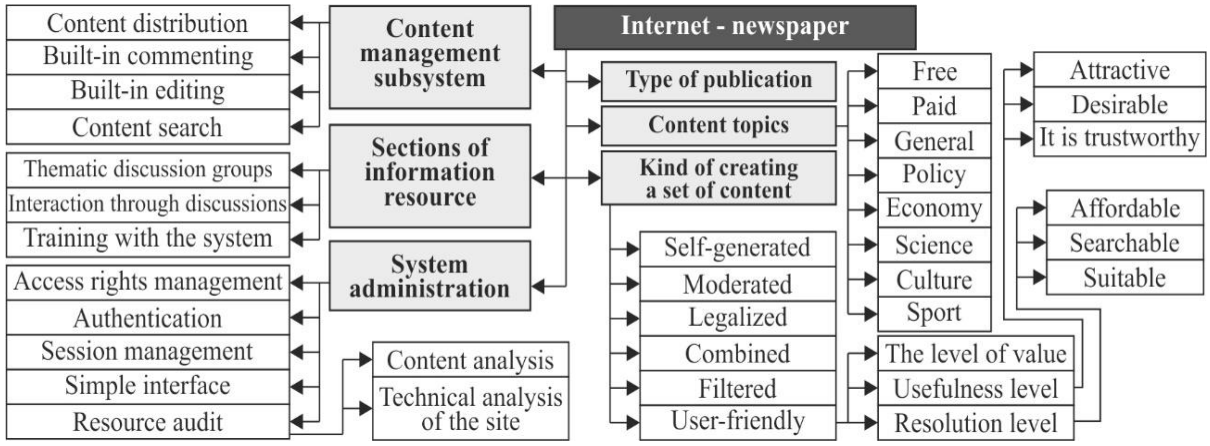

Figure 9: Classification of Internet newspapers

Table 17

The main differences between ECS and ECCS [30-38]

Characteristic	ECS	ECCS
Type of goods	Material	Intangible (content).
Volume of goods	Decreases	Constantly.
Availability of a warehouse	Present	Missing.
Product DB	Product description	Content and its description
Promotion goods	By keywords in the product description	By keywords in the content description and the content itself
Product search	By keywords in the product description	By keywords in the content description and the content itself
Detection duplication goods	Manually	Automatically (programmatically), application of known methods of detection and elimination of duplication of information.

Definition of ageing goods	Manually or on time	Automatically (programmatically), application of known methods of research of information on ageing
Definition relevance goods	Manually or by the number of recent orders compared to other charges or periods	Automatically (programmatically), application of known methods of information research for relevance
Analysis the audience	By orders, visits, and comments; a limited number of product attributes for analysis; comments do not capture the opinion of the audience	On content orders and content, page views and comments
Automatic formation digest	Impossible; a short description is formed manually	For example, the automatic generation of descriptions (digest, i.e. brief content) of articles in an online newspaper
Automatic formation goods	Impossible	For example, it may be possible to generate a new article in an online newspaper from a trusted news source.
Automatic formatting goods	Impossible	Such as, for example, automatic formatting of articles in an online newspaper according to audience class (age, gender, profession, etc.).
Experience user	It does not significantly affect the increase in sales of goods	Significantly affects the level of subscription of goods.

Table 18

Classification of Internet newspapers by type of articles created [113-119]

Articles	Characteristic
Actually generated	Own journalists describe events, interview participants of events.
Moderated	Journalists/moderators independently search for material on the Internet, analyse and organize the material received, write based on this material of the article.
Legalized	Material for future articles looks for a module of the system by links or subscriptions, moderators analyse and organize the material received, write based on this material of the article.
Combined	A combination of the first three types
Filtered	Material for future articles searches for the module of the system by links or subscriptions and filters according to the dictionaries contained in the module, and moderators analyse and organize the material received, write based on this material of the article.
Aimed at user	Filtered, but the formation of the article considers the level of user experience, formed pieces primarily for users with more experience.

Table 19
Formal Content Management Models [9, 39-48]

Name	Formal Content Management Model
Barton-Kebler	$C =< A,B,T >$. Internet space is divided into stable and dynamic components with different characters and joints regarding content flow management integration. The regular Internet component contains "Long-lasting" content, and the active ingredient has constantly updated resources. Some of this component then flows into the stable, the other part and to disappear or fall into the hidden Web-segment space is not available for additional users of my public information retrieval systems. The most dynamic segment of the content is news, which is also the highest level of upgrades, and it generated and distributed large amounts of data. Therefore, it is the best object of research. The processes of content ageing, the loss of its relevance, are described by an equation of two components $m(t) = 1 - ae^{-T} - be^{-2T}$, where $m(t)$ is part of the helpful information in the total flow over time T, the first denial corresponds to the stem and flax resources, and the second - dynamic (news). Content dynamics in the network is conditioned with many factors that cannot be accurately analysed. Within modelling, a reasonable assumption is the general nature of the temporal dependence of the number of thematic publications determined by simple laws. For more adequately support should refer to the complex of about actually.
Classic space-vector	$C =< TF, IDF >$. The model described by the equation $C = TF * IDF$ where TF is the local frequency Terms (Term Frequency, level of significance of terms within the content), and IDF is the reciprocal frequency of the message throughout the stream of content that E s tit this term (Inverse Document Frequency, level of uniqueness Term throughout the content stream). The product of these values - a criterion for determining the significance of what was the (weight). Content (messages, news) is ageing, losing its relevance with an intensity determined by some empirical law. For illustration, let's assume that it's exponential law. One of the suggested approaches to that pare of generalization, such as message ranking, is the use of dependent parametric factors. For example, it is determined the weight of the message as the product multiplication $TF * IDF * e^{-\alpha t}$. Value α is some constant, t is the length of time that has elapsed since the notification in the stream of content. Value α is a factor n and the half-life relevance of content. If the expected use exponential model is $e^{-\alpha t} = 1/2$ determined with expert route by which the message through ageing loses its significance in half. Accounting for content ageing (loss of some relevance) is of great importance in analytical studies, the creation of information products (information portraits), the central storylines of events, and the ranking of information retrieval systems. An approximate estimation of the rate of content ageing is of practical value in determining the set of topical content.
Linear	$C =< Y,T,T_0,V >$. Management Dynamics thematic content (relevance/ageing) is done linearly. The number of messages in the time t described by the formula $y(t) = y(t_0) \pm v(t - t_0)$ where $y(t)$ is some notes at a time t, v is the average speed of increase/decrease of content intensively in time (e.g., due to ageing). Content component content quantitatively assessed as fluctuation (deviation from but he mi) stream content. It is change the default critically departed $\sigma(t_i) = \sqrt{\frac{1}{i}\sum_{k=0}^{i}\{y(t_k) - (y(t_0) \pm v(t_i - t_0))\}^2}$. With change $\sigma(t)$ process of changing the subject content is a process independent of magnification (do not include links to the previous content).In case of standard deviation by time such as $\sigma(t) \infty t^{\mu}$, the bigger

Exponential	μ (degree of connection between random events $\left[\frac{1}{2};1\right]$) the higher is the correlation between the current and previous content. $C=<N,T_0,T,\lambda>$. The process of increasing the relevance/ageing of content is described by dependency $N(t)=N(t_0)e^{\lambda(t-t_0)}$, where λ is the average relative change in the intensity of the content stream. With a shift in power at a specific time $\lambda(t_i)=(N(t_i)-N(t_{i-1}))/N(t_{i-1})$. Change the value fluctuations $\lambda(t_i)$ about the mean options $\sigma(t_i)=\sqrt{\frac{1}{i}\sum_{k=0}^{i}\{\lambda(t_k)-\lambda\}^2}$. When changing $\sigma(t)$ as a square root of time, the process is independent increases (correlation between individual and m content is insignificant). A significant amount of dependent content is valid $\sigma(t)\infty t^{\mu}$ within the range $\left(\frac{1}{2};1\right]$, which indicates the presence of long-term system memory. Such systems make class-similar processes taking into account correlations between content at different times.
Logistic	$C=<N,T,M>$. Generators of content in most operating in a steady-state characterized by maximum content space capacity N (the dimensionality of the parameters and their measurement are not taken into account). Each organization generator generates a stream of content on average constant for the number of signs and messages of Laziness. Over time, only the volume of notes on a topic changes. Increased number one topic content accompanied in decline in the range of another issue because $\forall\Delta T$ we $\int_0^T\sum_{i=1}^{M}n_i(t)dt=NT$ were the amount of content per unit of time and the total number of all the possible problems. The part is $n_i(t)$ always 0.
Analytical	$C=<W,D>$. Weight content is defined as $W_D=\frac{\sum_{w\in D}w}{\lvert D\rvert}$ where W_D is weight content w is weight keyword content (it is a monotonically increasing function of n) $\lvert D\rvert$ is the number of keywords in the content ($1\le\lvert D\rvert\le 12$). Average weight University and locally keyword are $w(n)=n/v(n)=n^{1-\beta}/K$ where n is the total number of words stream K is the number of unique words.

Table 20
CMS components [9, 39-48]

Model	Advantage	Drawback
R.E. Burton and R.W. Kebler	Describes the ageing process of content, the loss of its relevance. The equation of the model has an exact solution in an elementary and convenient function - exponents. It is determining the speed of development of individual thematic.	It isn't peculiar in terms of interpretation of the results. It grows monotonically and does not describe the processes that must have local extremes by their nature.
Spatially-vector	Defining a meaningful term across the entire content stream. Ability to identify the most up-to-date content from the many available ones	Mandatory ' these patterns ranking content using pairs of parametrical multipliers that depend on the time
Linear	Determining the intensity of a thematic content stream over time (e.g., as a result of ageing)	They are applied with linear dynamics control of thematic content.

Exponential	Describes the ageing process of content, the loss of its relevance.	There is no correlation between unique content and content.
Logistic	It combines the relative simplicity of problem formulation with the ability to vary the solution using a set of parameters with more or less transparent physical content.	Study the dynamics of only a single thematic flow. The dimensionality of the parameters and their measurement is not taken into account.
Analytical	Describes the ageing process of content, the loss of its relevance.	Mandatory ' compulsory presence dictionary of keywords

Using a CMS does not require installing special software in the workplace. They use a regular browser (Google Chrome, Internet Explorer or Opera) for editing and administration. The intuitive interface and ease of use of the system make it easier to manage the site and reduce the further costs of maintaining the Web resource. To work with the design, you need only have basic Internet skills. The most popular CMS is Drupal and Joomla! When considering the content item dynamics at current content in the county limited models (Table 19-20) that paves the way for further research [1-18]. Content management models are designed to determine the ageing/relevance of content flow. They do not solve the problems of content creation, implementation, and they do not solve all content management problems:

- Submission of a plurality of content to the end-user according to his / her request, history or portfolio;
- Formation of digests; automatic information portraits;
- Automatic detection of thematic subjects;
- Automatic construction of tables of the interrelation of concepts;
- Calculation of concept ratings;
- Automatic collection of information from various sources;
- Automatic formatting of information;
- Automatic detection of keywords;
- Automatic content categorization;
- Duplicate detection and selective dissemination of content;
- Attract potential users.

Fig. 8 is a graphical diagram of a typical regional information resource developed by CMS Joomla! Apply method and online marketing for the analysis of Web resources in the region. Fig. 10 shows IDF0 diagram of a typical regional information resource.

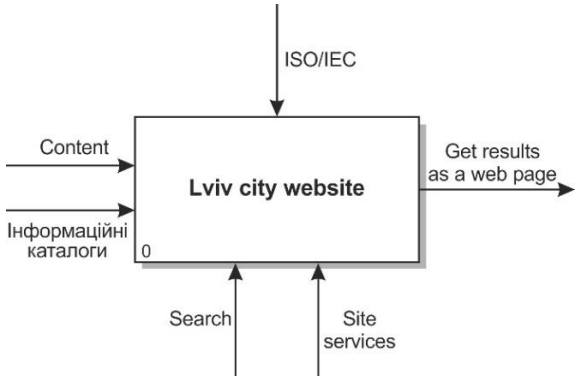

Figure 10: Context diagram of a typical regional information resource

3.2. The most effective methods of attracting potential customers

Forms on the information resources of some advertiser-friendly are due to both. They have the right to send their contact details and additional information about the products/services of the advertiser. Persons who have provided information through such forms on an advertiser's information resource are

potential customers. Analysing this data and using it effectively helps build a profile for your possible audience. To do this, you must use the following methods.

1. Optimize your AdWords campaigns. After clicking on the ad, visitors expect to take some action on the landing page. The visitor must have the right idea of what he can expect before clicking on an advertisement. For this optimization campaign AdWords, will establish rates for the required keywords if necessary using negative keywords (search terms reports analysis), uses UT accurate yet descriptive and engaging ad text and set up conversion tracking. Tracking the landing page bounce rate and conversion rate and comparing them to different variations of ad text that drives traffic to the page can help you determine how well your ad was performing (Fig. 11).

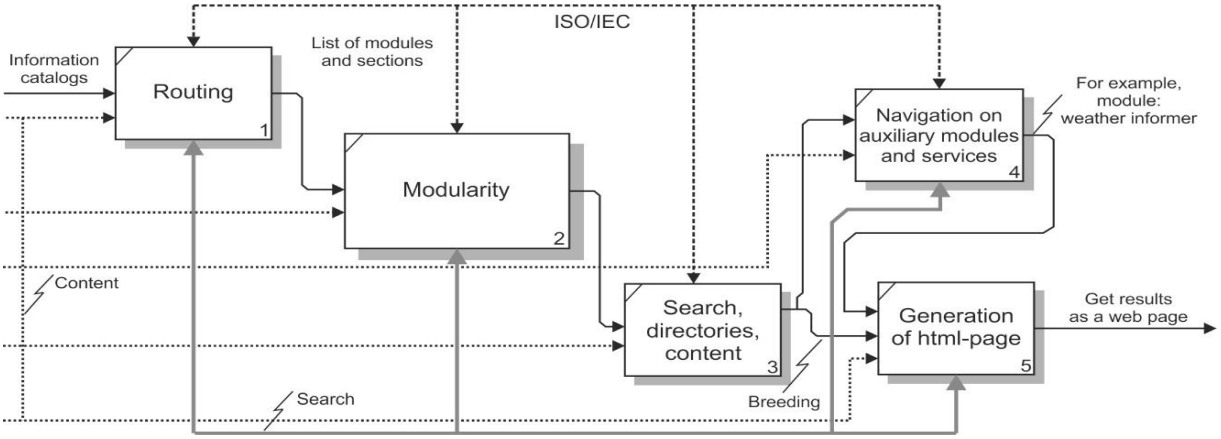

Figure 11: IDF0 diagram of a typical regional information resource

2. Landing page optimization. When a visitor lands on a landing page, their expectations must be met or exceeded. Goal pages will upload fast; transitions between them should be convenient and satisfy you with Google's landing page. To expand the client base with the use of forms, landing pages have to be done very simply and understandable. Visitors landing page may feel uncomfortable providing their information if they think the site is trustworthy. Reducing the amount of information a visitor needs to enter and solely requesting the information they need to continue communicating with the visitor will increase the likelihood of completing the form. If a visitor starts filling in your paper but then decides to leave before submitting (such as the form is too long), the program Web - analysts register it as a rejection.

3. Involvement of interested clients. Not every potential customer who fills in the form will become a real customer. There may be several reasons: the landing page is not clear; the record does not confirm the information provided; a unique program that scans sites and distributes spam and more automatically fills the form. Google cannot control user behaviour on the site. In addition to optimizing your AdWords campaign and landing page, there are several other ways to prevent bogus customers from registering on your site.

1. *Add word verification.*

2. *Enable auto-tagging in AdWords*. To URL-address of the target page linked the GCLID parameter for defined spare revision of the page because of clicking on an ad.

3. *Registration of applications*. Each time a visitor submits a form, you can log their IP address, GCLID parameter (if available), referrer URL, and user agent. Based on this data, you can determine if there is traffic from ad clicks and whether there is suspicious activity. When questionable first asset of art and visitors coming to your site via AdWords can resend to Google GCLID options or the visitor's IP address. Google's Advertising Traffic Quality team will check your account.

3.3. View your Google Analytics data in AdWords reports

By looking at Google Analytics site engagement statistics along with AdWords performance data, you can find out what users do after they click on your ads and land on a landing page. These statistics submitted the following information.

- **% New Sessions** is the approximate percentage of first-time user visits.

- **Pages / Session** is the average number of pages viewed per session.
- **Average Session Duration is the average amount of** time a user stayed on the site.
- **Bounce Rate**. If a site visitor has viewed only one page or triggered only one event, Analytics counts it as an *opt-out*. Bounce Rate is the percentage of sessions that are interrupted.

This content shows how effective the content is on the content resource and helps you decide on optimising your budget, bids, landing pages, and ad text. For example, by comparing the bounce rate and CTR for the content group (Fig. 12), you can get an idea of how well the site meets the users' expectations involved in the ads.

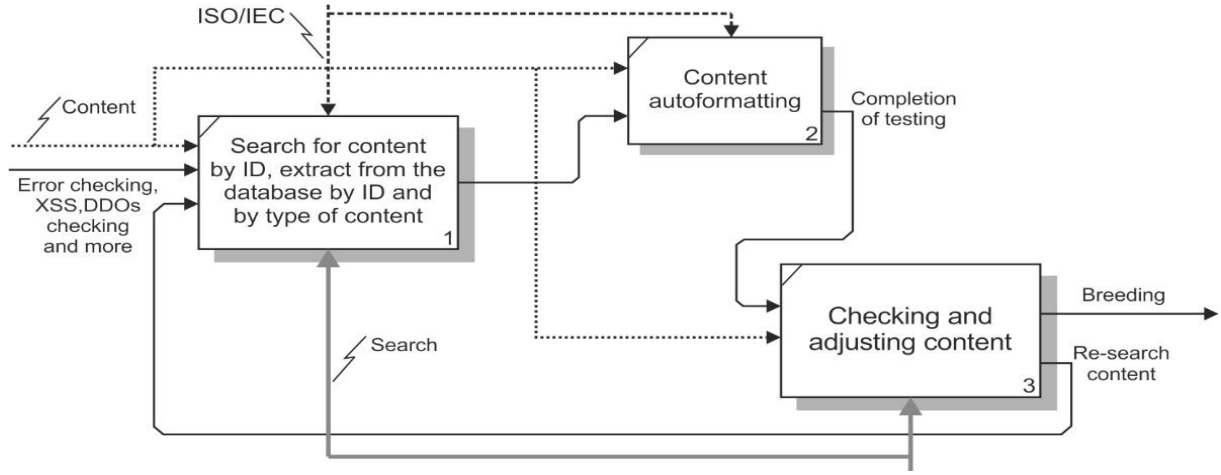

Figure 12: IDF0 diagram of Content Search Ads

For example, in Table 21 that the *Topic* 1 ad group has not only a higher CTR (8%) compared to the similar *Topic* 2 ad group (6%) but also a higher bounce rate (60%).

Table 21

An example of analyzing content ad groups on an information resource

Ad group topics	CTR	Impressions	Bounce Rate	Ad clicks	Users who remain on the site
Theme 1	8%	1000	60%	80	32
Theme 2	6%	1000	30%	60	42

The means that more than half of the users who visited the site after clicking ads in *topic* group 1 did not stay there to view the offers or make a purchase in more detail. Even though ad group *topic* 2 receives fewer clicks, the return on investment in them is higher because users involved in this advertising are more likely to linger on a typical regional information resource (Fig. 13).

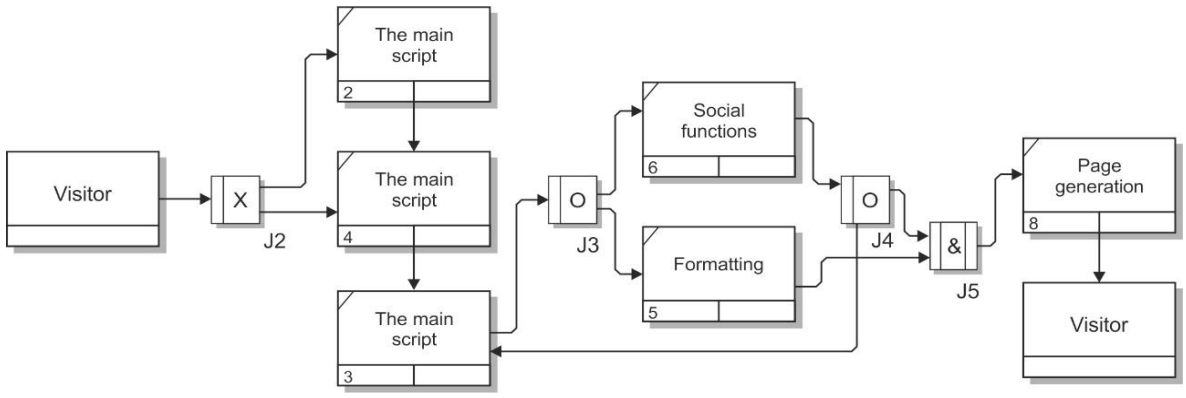

Figure 13: IDF3 diagram of a typical regional information resource

3.4. Analysis of indicators of refusal to visit the information resource

Bounce Rate is the percentage of visitors who view only one page when they visit your site. There are reasons number why there may be a high failure rate (Fig. 14) [120-124].

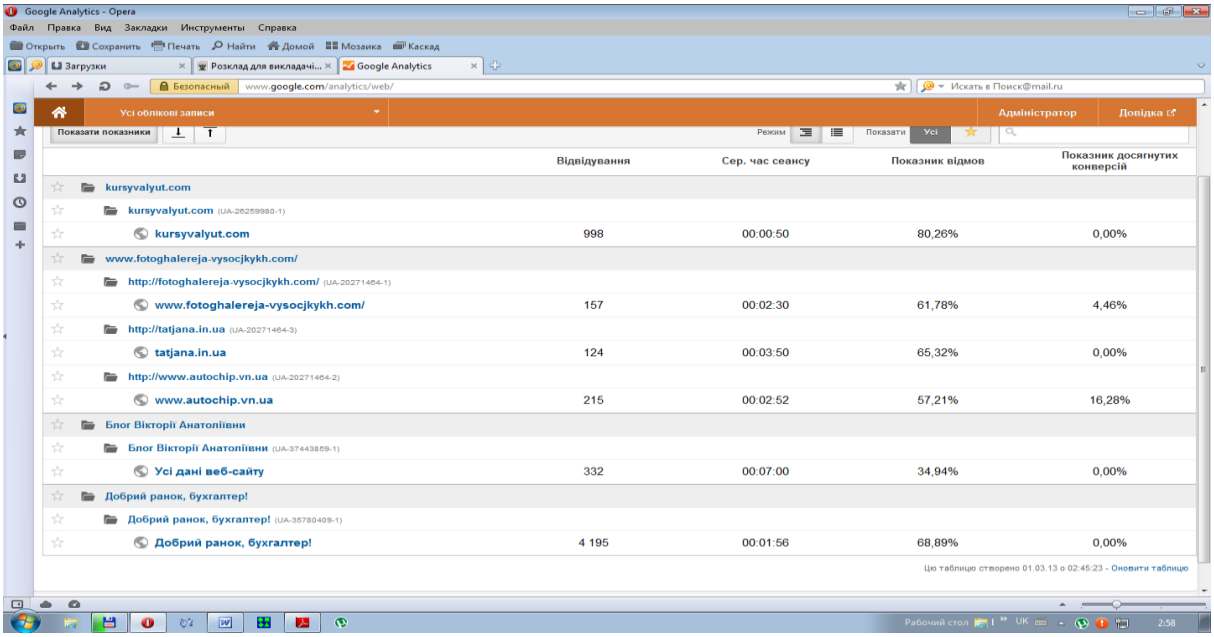

Figure 14: Examples of bounce rates

For example, visitors may leave the site on the sign-in page because of the site design or usability issues. Alternatively, it may be that only certain pages on the site have a high bounce rate for excellent reasons. Here are some of the problems that can cause a high bounce rate: To understand the difference between an Exit Rate and a Bounce Rate for a specific site page, you should consider these three aspects [120-124].

- For all page-views, the exit metric is the percentage of recent views per session.
- For all sessions initiated from a page, the bounce rate is the percentage of visits per session.
- The bounce rate for the page is calculated based only on the hits that started from that page

Consider this last aspect in a simple example. The site has pages *A* through *C*. There is only one session per day with the page view below [120-124].

$$Monday: Page\ A \rightarrow Page\ B \rightarrow Page\ C$$
$$Tuesday: Page\ B \rightarrow Page\ A \rightarrow Page\ C$$
$$Wednesday: Page\ A \rightarrow Exit$$

The Content Report for Page *A* will show you three page views and a bounce rate of 50%. The bounce rate will not be 33% because Thursday's page-view *A* is not considered in the bounce rate calculation. A speech is a session in which there is only one interaction with the visitor. The bounce rate for a page is only relevant when a session starts from this page. Now let's examine the performance and failure rates for a group of days with one session on the site [120-124].

$$Monday: Page\ B \rightarrow page\ A \rightarrow page\ C$$
$$Tuesday: Page\ B \rightarrow out$$
$$Wednesday: Page\ A \rightarrow Page\ C \rightarrow Page\ B$$
$$Thursday: Page\ C \rightarrow Exit$$
$$Friday: Page\ B \rightarrow Page\ C \rightarrow Page\ A$$

Below are the calculated percentages of outputs and failures [120-124]. Output metric:

Page *A*: 33% (Only 3 of 5 sessions featured Page *A*)
Page *B*: 50% (Only 4 of 5 sessions contained Page *B*)
Page *C*: 50% (Only 4 of 5 sessions included Page *C*)

Bounce Rate:

Page *A*: 0% (No session started from Page *A*, so no Bounce Rate)
Page *B*: 33% (Bounce Rate is Higher than Exit because Page *B* has 3 sessions, and one of them has failed)
Page *C*: 100% (one session started from Page *C* and led to opt-out)

3.5. Goal Conversion Rate

For chosen objective i, where $i = \overline{1,20}$, this figure represents the percentage of visits that resulted in a conversion (this goal). Transformation occurs when a visitor reaches a destination. There are three types of plans [120-124]:

- *The destination URL* is the page that visitors see immediately after the action is completed. To sign up for an account, thank you for registering or thank you for your purchase page or a receipt page. This goal initiates a conversion when a visitor views the specified page.
- *Site Time is the time* limit you specify for a site moderator. When a visitor spends more or less time on a site than a specific time limit, a conversion is made.
- *The number of pages viewed per visit* allows you to determine the page-view threshold. When a visitor views more or fewer pages than the limit, the conversion is completed.

Goals and Funnels is a versatile way to determine the success of an information resource or program based on your goals. The funnel can be used to specify the expected traffic path to reach a goal. The combination of goals and funnels allows you to analyse how effectively a site or program is driving users toward the goal. Each time a user action meets a goal, a conversion is recorded in Google Analytics. If you set a goal value in monetary terms, your conversion data will also contain the corresponding values. Goals with Goal Completions (i.e. Goal Completions Levels) can be viewed in Goal reports. You can also analyse goal completion conversions with other messages, including visitor reports, traffic, Site Search reports, and event reports [120-124].

There are four types of targets to choose. When a visitor completes a selected action, a conversion is triggered and recorded in goal reports. You can choose the type of tracking goal you want from the list when setting up goals in your account [120-124].

- Destination URL: The address of a specific placement, such as a web page (or virtual page) or application screen that has been downloaded. Thus, a webpage or screen of a sign-up application can be a destination for an e-commerce campaign to identify potential customers. This goal goes well with the sequences.
- Visit Duration: Visits that last for a fixed time or longer. You can use this goal to determine the number of visitors who stay on the page or purchase screen for more than 2 minutes.
- Pages / Visits (For Web Pages) Screens / Visits (For Applications): A visitor views a certain number of pages or screens during a session. Uses UT this type of goal when you want to capture visitors who see, for example, less than three pages.
- Event: The visitor triggers an action that the moderator defines as an event (such as a social recommendation or an ad click). You must first set up Event Tracking before setting up a Goal of this type.

Goals are automatically grouped in sets, but the moderator determines which plans should belong to each location. Uses UT sets to categorize the different types of goals for the site. You can track downloads, signups, and receipt pages in separate goal sets. Goals are set at the profile level (up to 20 in a single profile). Each profile can create four groups with a maximum of five goals. To track more than 20 goals for a website or program, create a new profile for that property [120-124].

When setting goals conversion value of a dollar, each time the goal is reached, that number will be logged. Then, all cases of the registered number will be added and displayed as *Goal Cost*. Any action taken by a user on a website or program can be carried over in dollars. One way to determine the value of a goal is to calculate how often customers who have reached a goal become customers. If the sales team is addressed by 10% of subscribers to newsletters, and the average transaction amount is 500, then the cost of a *subscription to newsletters* can be set at 50 (i.e. 10% of 500). Visitors reach their goals when they go to the last sign-up page. However, if only 1% of all subscribers make a purchase, then the cost of the *Newsletter subscription* can only be assigned a value of five. Although it is unnecessary to set prices when setting goals, they use this option to estimate weight and profit from any visitor interaction with the

site. System Google Analytics also uses the Goal Value data to calculate other indicators such as return on investment (ROI) and average. You can use the *funnel* to specify the expected traffic path to reach your destination. Focusing on the steps of the funnel fixed by the moderator, Analytics tracks the times when visitors come and leave the goal. This WMS to obtain valuable information about the site. For example, you could identify a page in a funnel that captures many exits on the way to a goal, indicating problems with that page. If there are many missed steps, this will display difficult navigation or too many conversion paths with many unnecessary steps. Funnels can only use in conjunction with a destination. The last page in the funnel is a goal page (entered as a goal), while the previous pages form a funnel. If the goal of the funnel is to attract leads, then the first page of the funnel can be assigned the URL of the contact request form, and the landing page is the URL for the thank you page for the request that is displayed after the user requests the contact [120-124].

3.6. Calculation of indicators

1. "Compared to homepage" metric. This metric compares the conversion rates of the experiment page and the original page [120-124].

The following formula makes the comparison:

$$\left(\frac{\textit{рейтинг конверсій експериментального варіанта}}{\textit{рейтинг конверсій початкового варіанта}} - 1 \right) \cdot 100 \ .$$

For example, if case Variation effective than the original:

- Experiment Conversion Rate = 35%
- Initial conversion rate = 25%

Then, value index n is compared to your original $\left(\frac{35}{25} - 1 \right) \cdot 100 = 40$ %.

If the experimental variant is less effective than the original variant:

- Experiment Conversion Rate = 20%
- Initial conversion rate = 40%

Metric value Compared to % original page $\left(\frac{20}{40} - 1 \right) \cdot 100 = -50$.

The assist-to-recent conversions ratio results are from dividing the number of conversions. If a channel has repeatedly played an ancillary role on the path to one conversion, only one conversion is counted as an associate conversion for the metric. Associated conversions for different channels do not exclude each other. Associated conversion is taken into account for all channels that have an ancillary role in one conversion path [120-124].

To view a subset of conversion funnels, you need to apply conversion segments instead of filters with filters. Using a filter profile can adversely affect the accuracy of Multi-Channel Funnels reports. Using means the creation of conditions to specify the conversion paths to be included in the segment. For example, to set up a conversion segment that contains only conversion courses that begin with example.com, you must specify the following [120-124].

An Attribution Model is a rule or set of rules that defines how credits for sales and conversions are assigned to touchpoints with audiences in the path to conversions. For example, the Last Engagement attribute gives 100% credit to endpoints with audiences (i.e., clicks) that precede sales or conversions. The First Engagement attribute assigns 100% credit to the audience touchpoints that begin the path to conversions. Below is an example of attribution models. The calculated conversion value (and the number of modifications) for each marketing channel will vary according to the attribution model. A track that is mostly starting to drive conversions will have a higher conversion value than the Last Interaction attribution model, thanks to its attributive First Interaction model. A customer found the site by clicking on one of the paid ads. He returns in a week via a social network. On the same day, he produced a third time to get the goods - this time for one campaign through email. In the Attribution Model:

- *Last Interaction* last touchpoint - in this case, channel email - receive 100% credit for the sale.
- *First Engagement, The first point of contact with your audience,* is the paid ad channel - will get 100% credit for the sale.

- *Linear* every touchpoint on the path to conversion - in this case, the Paid Advertising channel, social network feeds and email - share equal credit (33.3% each) credit for the sale.
- *Over time*, audience touchpoints that are closest in time to sales or conversions get the most credit. In this case, email and social network channels will receive most of the credit because the customer interacted with them on the conversion day. Since engagement with a paid ad occurred a week earlier, this channel will receive much less recognition.
- *Based on the position*, 40% of the credit is assigned to the first interaction, 20% to intermediate interactions, and 40% to the last interaction. Feeds paid ad and email receives 40% credit, and social network - 20%.

Attribution Modelling lets you compare the impact of different attribution models on evaluating marketing channels. In the tool, select an attribution model (such as Last *Interaction*). Then the table will show the number of conversions (or, depending on your choice, the cost) for each channel calculated by the model you selected. You can select up to three attribution models at a time and compare the results of each one in the table. After importing cost data into AdWords or other similar information, columns will appear to help you analyse and compare the metrics. In addition to basic models, you can use attribution modelling to create, save, and apply a custom model that uses the rules specified by the moderator. It allows you to tailor the models specifically to the set of assumptions that need to estimate in the conversion path data. In the "Applying Special Credit Rules" section, you can specify conditions that determine touch points on the conversion path based on characteristics such as position (first, last, average, assist), touchpoint type (click, impression, direct visit), and also the type of campaign or traffic source (campaign, keyword, or other dimensions). After defining the touchpoints you want, you can specify how you would allocate the conversion credit for those points to other points [120-124].

All the rules is determined by the relative distribution of loans. For example, a linear model splits the conversion credit equally between touchpoints. Therefore, on the way to a four-conversion conversion, each touchpoint will receive 25% credit. However, if a paid ad channel is credited with 2 points and the third point on the path is "Paid Ads" [120-124], the credit will be applied as follows, as shown in Fig. 15.

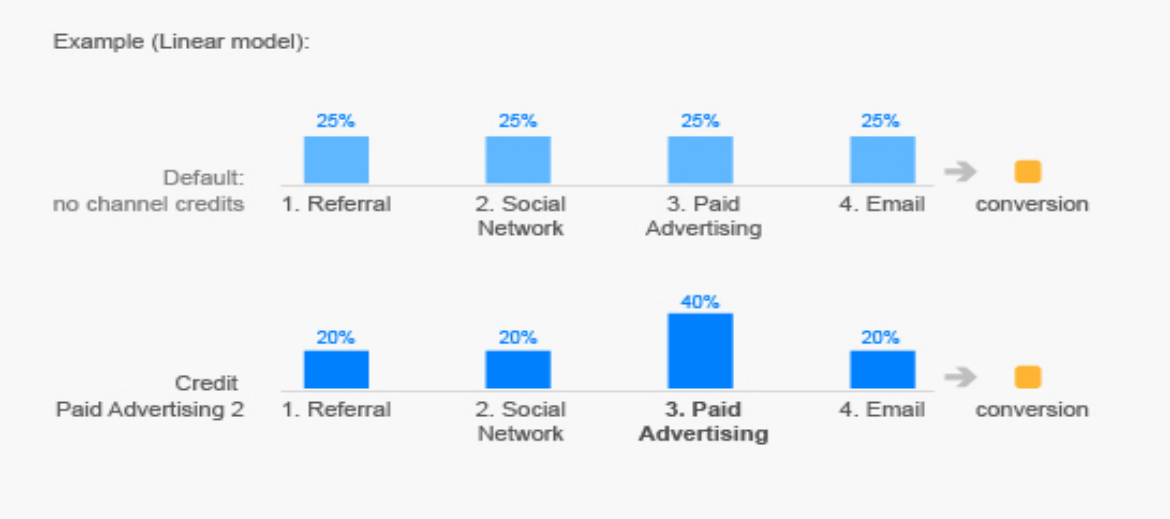

Figure 15: Paid Ads Example

After applying multiple rules to a single point of contact, the weight of the credit rules overlap will multiply. The *Last Interaction* Model transfers 100% of the conversion price to the last channel that the user interacted with before purchasing or completing the conversion. Google Analytics uses this default model to pass conversion costs into reports that are not multi-channel funnels. Because the Last Interaction model is the default model for messages that do not relate to multi-channel funnels, it provides valuable results compared to other models. Also, suppose ads and campaigns are designed to attract people at the time of purchase or are primarily engaged in transactions and have sales cycles that do not reflect phase. In that case, the Last Interaction model may be acceptable [120-124].

The *First Interaction* Model transfers 100% of the conversion cost to the first channel, with the user interacted. This model is acceptable if you are running ads or campaigns to create initial awareness. For

example, if a brand is poorly known, you can focus on the keywords or channels that are the first to represent the brand to the customer [120-124].

Model *Line* distributes equal credit to each channel interaction on the conversion path. The model is helpful if campaigns are designed to keep in touch with the customer and keep him informed throughout the sales cycle. In this case, each point is vital for the reflection process. If the sales cycle involves a brief reflection phase, you can use the *Impairment* Model *over time*. This model transfers most of the credit to the touchpoints that occurred in time closest to the conversion. If you run one- or two-day advertising campaigns, you can give more credibility to your interactions during the advertising days. In this case, the interactions that occurred a week before the promotion would receive only a tiny fraction of the credit compared to the touchpoints near the conversion. *Over time, the Attenuation* model appropriately credits touch points during the one or two days leading up to a conversion [120-124].

4. Experiments, results and discussion

Fig. 16 shows a contextual diagram of data flows of a typical regional information resource, and Fig. 17 shows a detailed flow chart of a specific regional information resource. Model *Position-based* allows you to combine the *Last Interaction* and *First Interaction* models. Instead of giving all the credit to the first or last interaction, it can split between them. Typically, 40% of the credit is assigned to first and last interactions, and 20% is to intermediate interactions. If they value more points of contact, which introduced a user's brand and points that led to the sale, uses a model *based on the position*. Fig. 18 shows an ERD of a typical regional information resource.

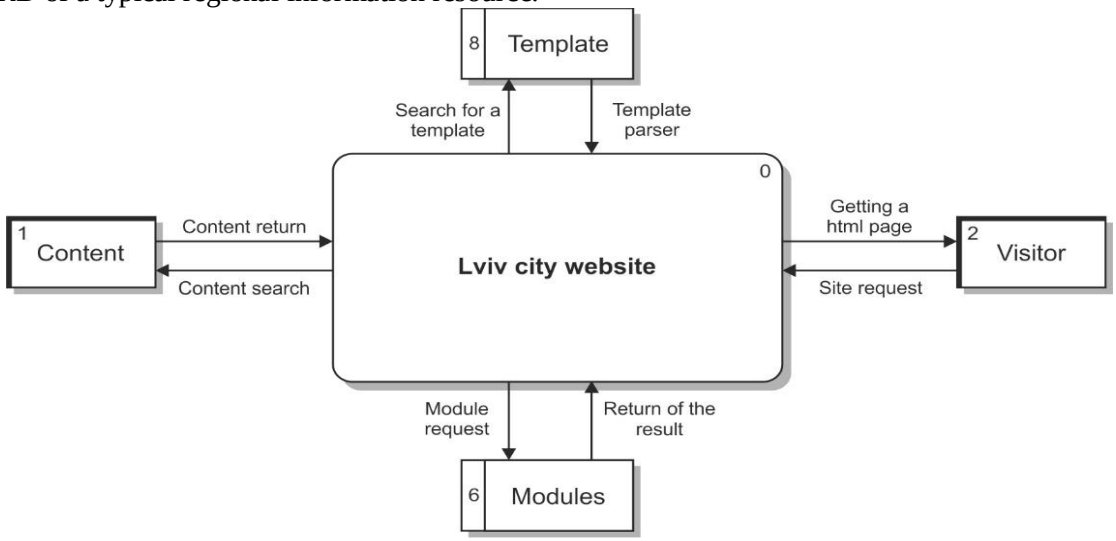

Figure 16: Contextual DFD is a typical regional information resource

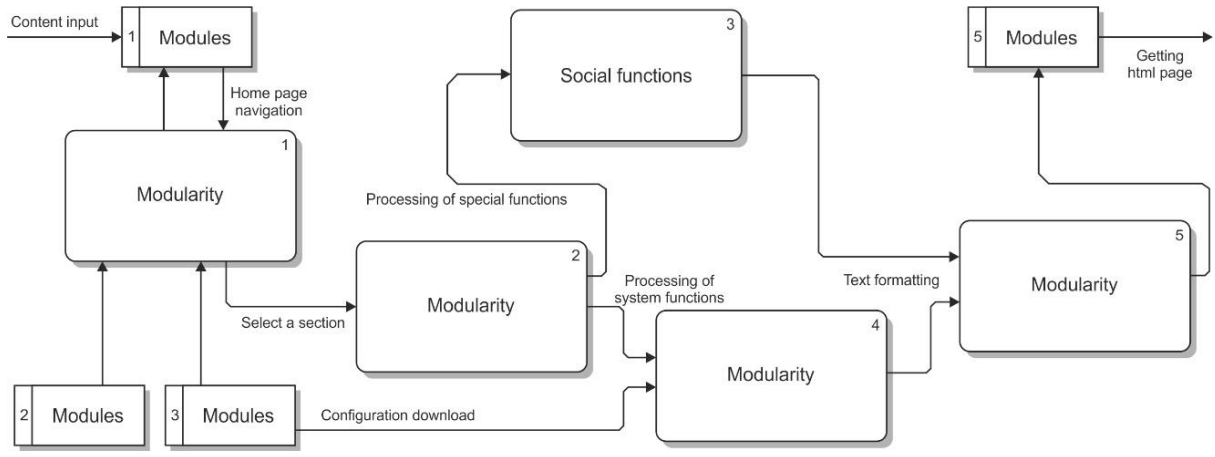

Figure 17: A detailed DFD of a typical regional information resource

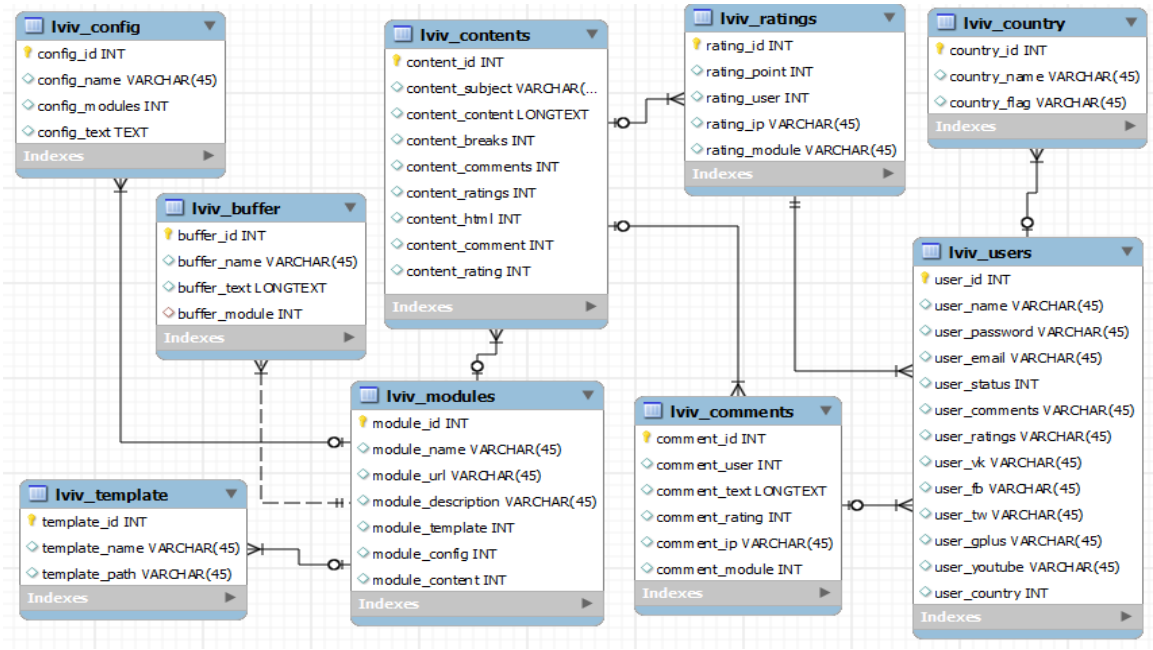

Figure 18: An ERD of a typical regional information resource

Mathematical relation for deterministic systems in the general case [125-136]:

$$\frac{dy}{dt} = f(y,t), y(t_0) = y_0, y = \begin{pmatrix} y_1 \\ \cdots \\ y_n \end{pmatrix}.$$

For the site of the Lviv city of consider the model administrator-visitor [125-136]:

$$\begin{cases} \frac{dy_1}{dt} = \frac{\left(y_2^{Cavg}\right)}{ALL} y_1 \\ \frac{dy_2}{dt} = \left(\frac{y_2}{ALL}\right)^{Call} \end{cases}, ALL \in (0;1]$$

where y_1 is the number of administrators, y_2 is the number of visitors, Cavg is the amount of content, Call is the total amount of content, ALL is useful information determined scale from 0 to 1.

The managed system based on Lotka-Volterra equations, also known as the predator-prey equations, looks like [125-136]:

$$\begin{cases} \frac{dy_1}{dt} = \frac{\left(y_2^{Cavg}\right)}{ALL} y_1 + f_1 u_1(t) \\ \frac{dy_2}{dt} = \left(\frac{y_2}{ALL}\right)^{Call} + f_2 u_2(t) \end{cases} \qquad I = \int_0^T \left[\frac{1}{2}\left(y - y^*\right)^T R\left(y - y^*\right) + \frac{1}{2} u^T Q u\right] dt \to \min_y$$

Linearization of function:

$$\frac{dy_1}{dt} = \frac{\left(y_2^{Call}\right)}{ALL} y_1 = 0\left(y_1 - y_1^*\right) + \frac{\ln Call}{ALL} \cdot y_1^*\left(y_2 - y_2^*\right) + o\left(y - y^*\right)$$

$$\frac{dy_2}{dt} = \left(\frac{y_2}{ALL}\right)^{Cavg} \quad y_1 = \left(\frac{1}{ALL}\right) y_2^*\left(y_1 - y_1^*\right) + 0\left(y_2 - y_2^*\right) + o\left(y - y^*\right)$$

$$A = \begin{pmatrix} 0 & \frac{\ln Call}{ALL} y_1^* \\ \frac{1}{ALL} y_2^* & 0 \end{pmatrix}$$

Discrete-deterministic model of information system. To implement this system, you can use 1 of 2 machines: the Mealy or Moore machine [125-136].

Type 1: Mealy Machine (Fig. 19-20, Table 22-23): $\begin{cases} z(t+1) = \varphi\left[z(t), x(t) \right], t = 0,1,2,...; \\ y(t) = \psi\left[z(t), x(t) \right], t = 0,1,2,...; \end{cases}$

Type 2: Moore machine: $\begin{cases} z(t+1) = \varphi\left[z(t), x(t) \right], t = 0,1,2,...; \\ y(t) = \psi\left[z(t-1), x(t) \right], t = 0,1,2,...; \\ y(t) = \psi\left[z(t) \right], t = 0,1,2,...; \end{cases}$

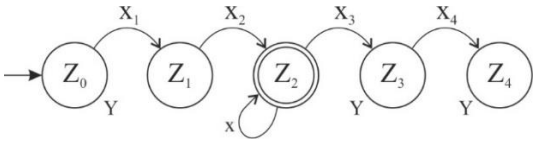

Figure 19: Mealy Machine Example, where Z_0 is request to the server, Z_1 is the processing of the request, Z_2 is running of the script, Z_3 is the connection to the database, Z_4 is generation and delivery of the page to the visitor.

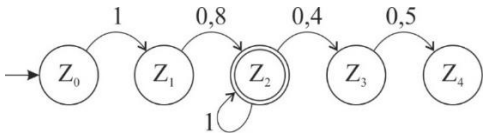

Figure 20: Discrete-stochastic model of information system example

Table 22
Mealy Machine Example

X_i	Z_k				
	Z_0	Z_1	Z_2	Z_3	Z_4
Transitions between system states					
X_1	Z_1	-	-	-	-
X_2	-	Z_2	-	-	-
X_3	-	-	Z_2	-	-
X_4	-	-	-	Z_3	-
X_5	-	-	-	-	Z_4
Exits					
X_1	Y_1	-	-	-	-
X_2	-	Y_2	-	-	-
X_3	-	-	Y_2	-	-
X_4	-	-	-	Y_3	_
X_5	-	-	-	-	Y_4

Table 23
Discrete-stochastic model of information system

Z_0	Z_1	Z_2	Z_3	Z_4
1	0	0	0	0
0	0.8	1	0	0
0	0	0.4	0	0
0	0	0	0.5	1
0	0	0	0	0

Continuous-stochastic model of information system. Every day new articles and new information are added to the database. Therefore, there is nothing in the drive at the beginning of the day. Thus, the states of the subsystem will be described by the system of equations [125-136]:

$$\begin{cases} P_n(t+\Delta t) = P_n(t)\left[1-(\lambda+\mu)\Delta t\right] + P_{n-1}(t)\lambda\Delta t + P_{n+1}(t)\mu\Delta t, n \geq 1, \\ P_0(t+\Delta t) = P_0(t)(1-\lambda\Delta t) + P_1(t)\mu\Delta t, \end{cases}$$

where $P_n(t)$ is the probability of the system being in a state, $z_n(t) \in Z$ at time *t*, that is, *n* applications, we differentiate a system if it has *n* applications [125-136]:

$$\begin{cases} dP_n(t)/dt = -(\lambda+\mu)P_n(t) + \lambda P_{n-1}(t) + \mu P_{n+1}(t) \\ dP_0(t)/dt = -\lambda P_0(t) + \mu P_1(t) \end{cases}$$

When equating time to zero [125-135]:

$$\begin{cases} (\lambda+\mu)p_n = \lambda p_{n-1} + \mu p_{n-1}, n \geq 1, \\ \lambda p_0 = \mu p_0, \end{cases} \quad \begin{cases} (1+\rho)p_n = p_{n+1} + \rho p_{n-1}, n \geq 1, \\ p_1 = \rho p_0. \end{cases}$$

when $P_1 = 1$: $p_n = \rho^n(1-\rho)$

The mathematical expectation of the amount of content in the system [125-136]:

$$l_n = \sum_{n=0}^{\infty} np_n = (1-\rho)\sum_{n=0}^{\infty} n\rho^n = \rho(1-\rho)$$

Average stay:

$$l_H = l_n/\lambda = \rho^2/\left[\lambda(1-\rho)\right]$$

Network model. With the help of the network model, I will build the principle of CMS work for the project (Fig. 21). To begin with, a user has requested a server [125-136]:

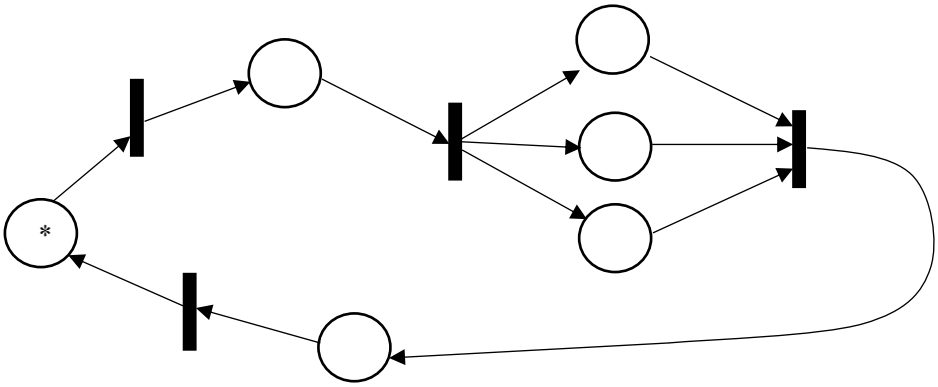

Figure 21: Network model example

Then the server transmits data to the script handler, the script itself to routing, and routing to modularity (Fig. 22). There is the module search, GET query template.

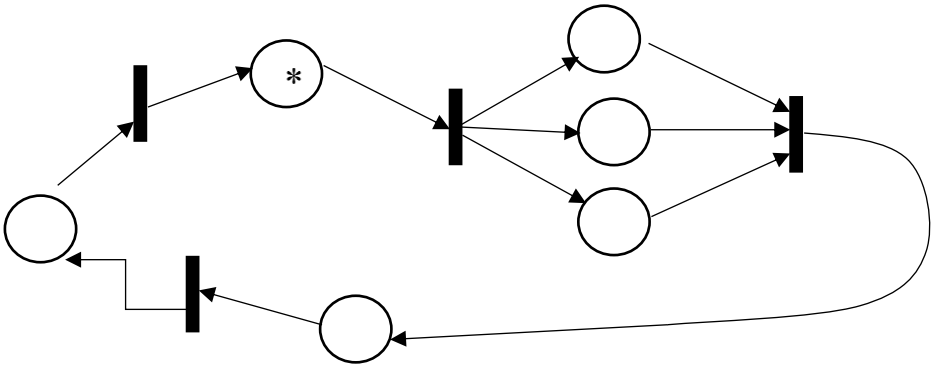

Figure 22: Network model example

After routing, the script selects the module type (content, directory, search) shown in Fig. 23.

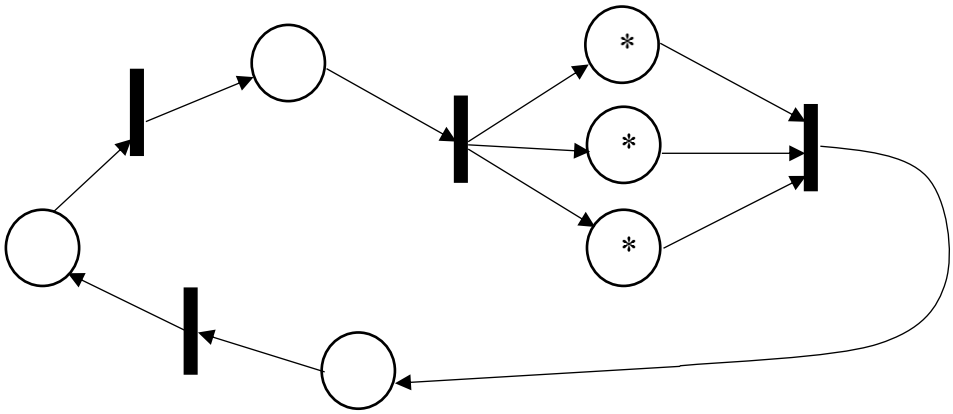

Figure 23: Network model example

The content type, module template, system module options, content and module itself are downloaded (Fig. 24). The server outputs the generated page to the user in the browser.

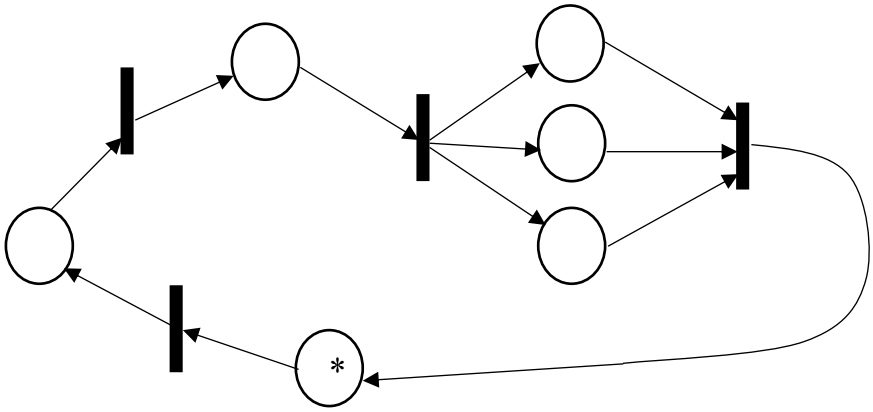

Figure 24: Network model example

Combined model. Fig. 25 shows Aggregation system [125-136], where A_1 is server, A_2 is CMS of our project, A_3 is DB and

1 is a server request.
2 is the connection to the database.
3 is errors.
4 is giving the client a generated page, shutting down.
5 is data transmission via POST, GET, HEAD method.
6 is data acquisition by POST, GET, HEAD.
7 is delivery of content by criteria.

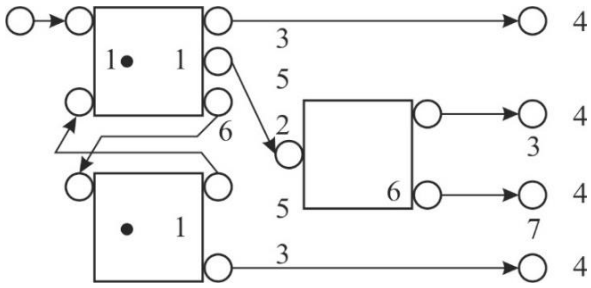

Figure 25: Aggregation system Example

5. Conclusions

1. The analysis of ways of forming commercial content is carried out. The known models of a life cycle of content and the standardized services of management of content give the chance to define requirements for creating an optimum life cycle of commercial content.
2. Internet technologies for the construction of service-oriented e-commerce systems are studied, making it possible to classify e-commerce systems and e-content commerce systems.
3. Information resources and production processes of e-commerce systems are considered in detail, making it possible to develop an optimal content life cycle and a typical architecture of e-commerce systems.
4. The technology of content management in e-commerce is analyzed, allowing the development of formal models, unified methods and software tools for processing information resources in e-content commerce systems.
5. From the standpoint of a systematic approach, an analysis of modern methods and tools for designing, modelling, and implementing electronic content commerce systems and substantiated the need and feasibility of creating unified procedures and software for processing information resources.

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