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Method of Selecting Electronic Services by Their Importance in the Information Systems for the Organization Staff

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ABSTRACT

This article discusses the issue of effective selection of real-time information services for law-based staff (G2E). Here, scheme of the process of service for employees in the state organization are developed.

The article discusses the issue of effective selection of electronic services in real-time, based on the user's rights in information systems consisting of a set of services. The process scheme of the symptoms that arises in inter-agency interconnections in the service has been developed. Parametric definitions with expert coefficients are added to each object in the process.

Effective selection of services creates a mechanism for increasing the service's importance by changing the timeframes of the service, the size of the service, the size of the execution and the coefficients. Specific criteria, functions, and algorithms have been developed for the mechanism that modifies the service volumes.

In the information systems providing services, it is recommended to use a mechanism for selecting effective services for the user.

Keywords: E-government, e-services, e-participation, EGDI, EPI, time function,rating function, service process, mathematical methods and algorithms.

INTRODUCTION

The services provided to citizens in the e-government system are open and permitted. These services are provided by the consumer subject and the object of its implementation through ICT tool. In the e-government environment, the services provided to public administration officials are limited only to those who are permitted. The automated management system services can be example for it. In general, organizations are considered as a complex of aim-oriented services.

The activities of the sectors to be explored may be considered as a truly targeted service. The information systems within the organization provide the information needed to provide real-process services, and provide services to the subjects based on information technologies. The information system does not automatically carry out the organization's activities, but rather controls the flow of information and the electronic services market.

The services are rendered to the functions, functions for promotions and promotions to users, as well as services to the posts and users, functions to users.

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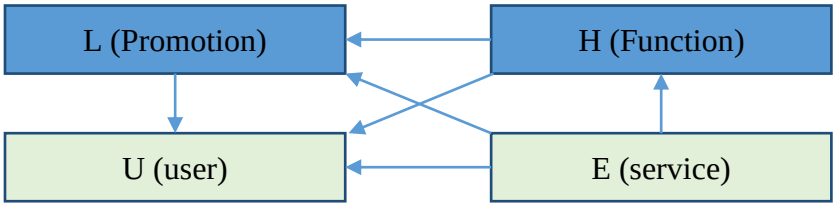
The provision of services is made through the following forms of classification: 1) service directly access to the users, functions and promotion; 2) service directly and forward to the users through the service function; 3) The service is available to the user according to promotion.

In general, all services on IS are targeted to users, their promotions and promotions are indicated on the scheme (see chart).



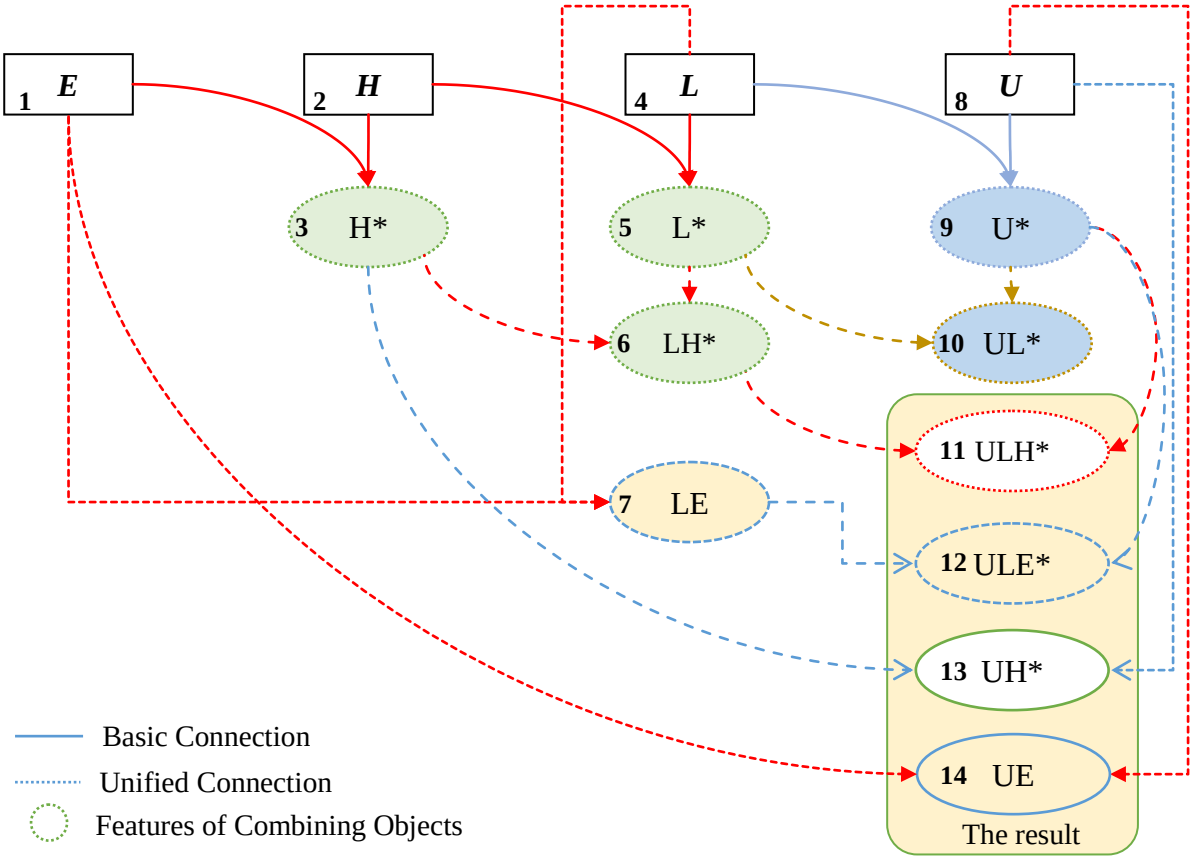
DATA AND METHODS

Execution of the problem

Systematic selection of important electronic services offered by the real-time user on the IS leads to the problem of intellectual choice of automatic invitation services.

An effective choice of IS services is to provide the user with a variable amount of time-dependent services. Here, the extent of service depends on factors such as the duration, importance, and dependency of the service.

The service life cycle includes frequency and time interval. The importance of the service is determined by the multiplication factor of the type of service (general, functional, document flow and direction). Also, a service may be linked to other services.



Picture 1. The service process diagram

In solving the problem, it is important to identify the elements related to the service delivery process and the factors that affect users in IS. Here, the subject is viewed as user, promotion, task and services. During the process, the chain of interactions between interstellar interconnected

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relations appears on the next objects. The interconnected relationship between the objects and the factors to be considered in the issue is reflected in the process diagram illustrated in Figure 1.

The process diagram objects and their impact factors can also be described as follows.

$$\begin{array}{lllllll} E & Service & & & e & & \\ H & Activity & & & h(e) & & \\ L & \text{Pr}omotion & & l(h) & l(h(e)) & l(e) & \\ U & User & u(l) & u(l(h)) & u(l(h(e))) & u(l(e)) & u(e) \end{array}$$

In this scheme, the elements of paragraphs 1, 2, 4 and 8, elements of factors affecting objects 3, 5, 6, 7 and 10, classification services provided to 11-14 points. As discussed in paragraphs 10 to 14, the problem of effective selection depends on the criteria applied to internal symptoms.

Now let's see each object in the process diagram, and the aims, objectives, and definitions of their relationships and symptoms.

1) As you can see from the process diagram, the object of the service is important and conditional. The following is a set of parametric services:

$$E = \{e_{i,j}, j = 1..k, i = 1..ne\}$$

Here are the service parameters:

$e_{i,0}$–special code; $e_{i,1}$–class;
$e_{i,2}$– service startup, $e_{i,3}$–finish time;
$e_{i,4}$– time of service activation;
$e_{i,5}$ – frequency of service;
$e_{i,6}$– obligatory or non- obligatory of the service;
$e_{i,7}$ – service dependency on other services;
$e_{i,9}$ – volume of completion;
$e_{i,12}$ – for authorized promotions;
$e_{i,13}$ –for functions;
$e_{i,14}$ –For authorized users;
$e_{i,15}$– expert coefficient.

2) Functions: $H = \{h_i, i = 1..nh\}$.

3)Function services:.

$$H^* = \{h^*_{i,j} = \langle 0,1\rangle, i = 1..nh, j = 1..ne\} = (h_1, \dots, h_{nh}) \times (e_1, \dots, e_{ne})$$

4)Promotions: $L= (l, l_2, \dots, l_{nl})$.

5)Functions ofpromotions:

$$L^* = \{l^*_{i,j}, i = 1..nh, j = 1..nl\},$$
$$(0 \le l^*_{i,j} \le 1)$$

6) Services provided to the promotion according to functions

$$LH^*\big|_k = \{\tau\big|_k \times H^* \times L^*\big|_k, k = 1..nl\} =$$
$$= (\tau^k_{i,j} \cdot h^*_{i,j} \cdot l^*_{i,k}) = (T^k_{i,j});$$
$$(i = 1..nh, j = 1..ne)$$

7) Services rendered without duty of promotion.

$$LE = \{\delta \times L \times E\} = (\delta_{i,j} \cdot l_j \cdot e_i) = (P_{i,j}),$$
$$(i = 1..ne, j = 1..nl, 0 \le P_{i,j} \le 1)$$

8) It is done by the settings of IS users:

$$U = \{u_{i,j}, i = 1..nu, j = 0..k\}$$

Parameters include:

$u_{i,0}$ –special code; $u_{i,1}$ –First name;
$u_{i,2}$ –login and $u_{i,3}$ – password;
$u_{i,4}$ –promotion (0 – no, 1 – yes);

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$u_{i,5}$ –presence of out-of-duty functions (0, 1);
$u_{i,6}$ –direct services (0 or 1) and so on.

9) Standard promotions (only in case of$u_{i,4}=1$) :

$$U^* = \begin{Bmatrix} u^*_{i,j} = \langle 0,1\rangle, u_{i,4} > 0, i = 1..nu, \\ j = 1..nl \end{Bmatrix} = (u_i) \times (l_j) = (u^*_{i,j})$$
$$(i = 1..nu, j = 1..nl)$$

.

10) Functions for users' promotions:.

$$UL^*\Big|_m = \begin{Bmatrix} \mu \times L^* \times U^*\Big|_m, \\ m = 1..nu, u_{m,4} > 0 \end{Bmatrix} =$$
$$= (\mu_{i,j} \cdot l^*_{i,j} \cdot u^*_{m,j}) = (R^m_{i,j}),$$
$$(i = 1..n\hbar, j = 1..nl)$$

11)*m* – user *k* –servicesof promotion functions.

$$ULH^*\Big|_m = \left\{\eta \times U^*\Big|_{m,k} \times LH^*\Big|_k, k = 1..nl, m = 1..nu, u_{m,4} > 0\right\}$$
$$= (\eta^{m,k}_{i,j} \cdot u^*_{m,k} \cdot T^k_{i,j}) = (G^k_{i,j}),$$
$$(i = 1..n\hbar, j = 1..ne)$$

12)*m* – unified services for user promotions.

$$ULE^*\Big|_m = \begin{Bmatrix} \lambda \times LE \times U^*\Big|_m, \\ m = 1..nu, u_{m,4} > 0 \end{Bmatrix} =$$
$$= (\lambda_{i,j} \cdot P_{i,j} \cdot u^*_{m,j}) = (V^m_{i,j})$$
$$(i = 1..ne, j = 1..nl)$$

13)*m* – unified of functions to the user.

$$UH^*\Big|_m = ULE^*\Big|_m =$$
$$= \left\{v^m \times H^*\Big|_m, m = 1..nu, u_{m,5} > 0\right\} =$$
$$= (v^m_{i,j} \cdot \hbar^*_{i,j}) = (Q^m_{i,j}),$$
$$(i = 1..n\hbar, j = 1..ne, u_{m,5} > 0)$$

14) Direct rendering of services to the user.

$$UE = \{\rho \times U \times E, u_{m,6} > 0\} =$$
$$= (\rho_{i,j} \cdot u_j \cdot e_i) = (W_{i,j}),$$
$$(i = 1..ne, j = 1..nu, u_{m,6} > 0)$$

The above definitions τ, δ, μ, η, λ, ν, ρ – Variable coefficients for variable processes. The parameter assignment of objects and symptoms in the process diagram is a key factor in investigating the issue.

RESULTS

Solutions of the problem.

In the solution of the problem, effective selection of services will be possible through the establishment of a mechanism of increasing the value of the service, which will allow to achieve a substantial automatic change of the coefficients of service relative to the nearest services, the service dependency and the volume of services rendered.

Now, with the introduction of 1-10 padding, we will develop a mechanism of effective measurements of services in paragraphs 11 to 14.

The mechanism of effective selection of services has basically two stages, ie: 1) identifying the importance of services in their parameters and their interconnection, and 2) identifying the importance of intermediary services. The basis of the mechanism for changing the range of

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provided services consists ofvarious criteria, mathematical methods and algorithms.

Mechanism that identifies the parametric features of the services

The main features that affect service impact are as follows:

1) coefficient of experts in service;
2) frequency and duration of service;
3) volume and dependence of services;

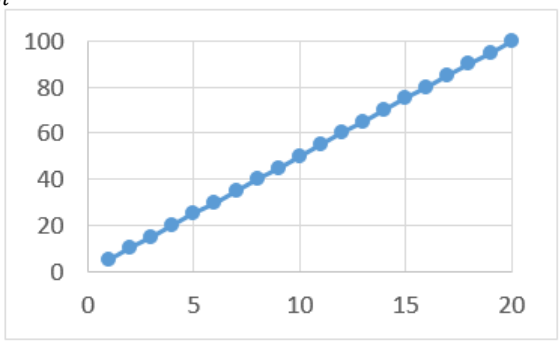
Now we have to see the functionality and algorithm of the mechanism to determine the importance of complex service replication.

Timing function

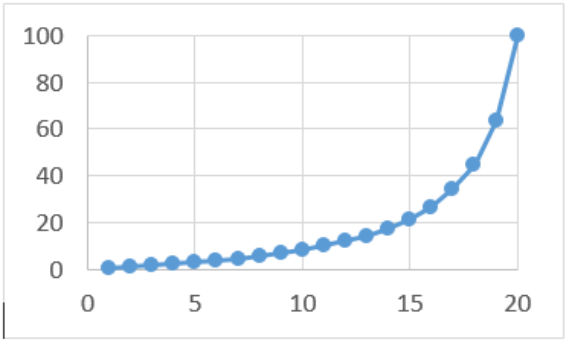
The purpose of the time function determines the [a, b] interval, and determines the [d]current value of the service in percentage. The function works in several ways.

$n = b - a + 1,\ d_i (i = 1..n, a \le d_i \le b)$

a) Linear method:$Af^1 = \frac{100}{n} \cdot (d_i - a + 1)$



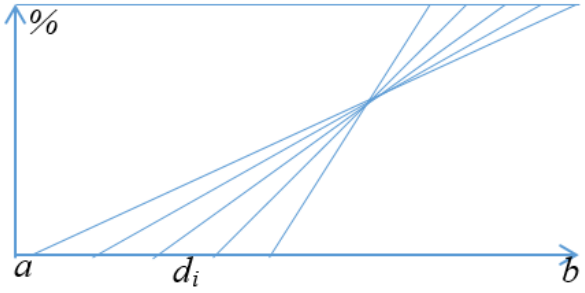
b) Hyperbola method:$Af^2 = \frac{1000}{n} \cdot \frac{d_i - a + 1}{b - d_i + 1},\ (a \le d_i \le b)$



c) Interval distortion method. May $0 \le \alpha \le 1$has been given, if the current time *(d)* is less than the initial limit *(a)*, then the final boundary *(b)* narrows down to *(a)* the current time *(d)*.

$$x_i = \left((b - d_i + 1) - \alpha(d_i - a + 1)\right) \times (d_i - a + 1)$$

$$Af^3 = \begin{cases} x_j, x_{j-1} > x_j \\ \max(x_i) \end{cases}$$



1. Time interval

Time interval of service execution $e_{i,2}=a$, $e_{i,3}=b$ the parameters are passed to the time

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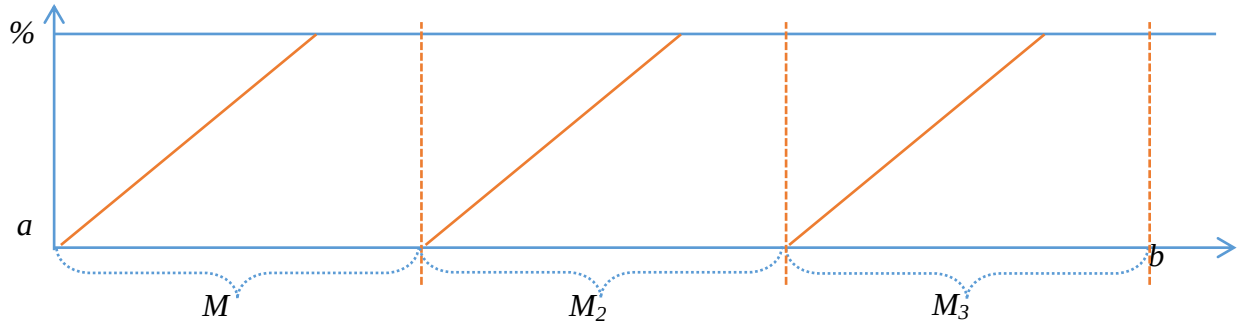
function. Result indicator ε_1 are recorded.

2. Frequency of Services

Frequency of Services as in the parameter of $e_{i,5}=ds\ (ds\geq 1)$ in the service $[a,b]$,the number of repetitions in the interval is indicated. Here, the beginning of this period (B^a) and final (B^b) intervals are determined the start time (d_i) to what period (B) consists of.

$$B = \left[{}^{d_i}/_{ds} \right] + 1, B^a = a + ds(M-1), B^b = a + ds \cdot M$$

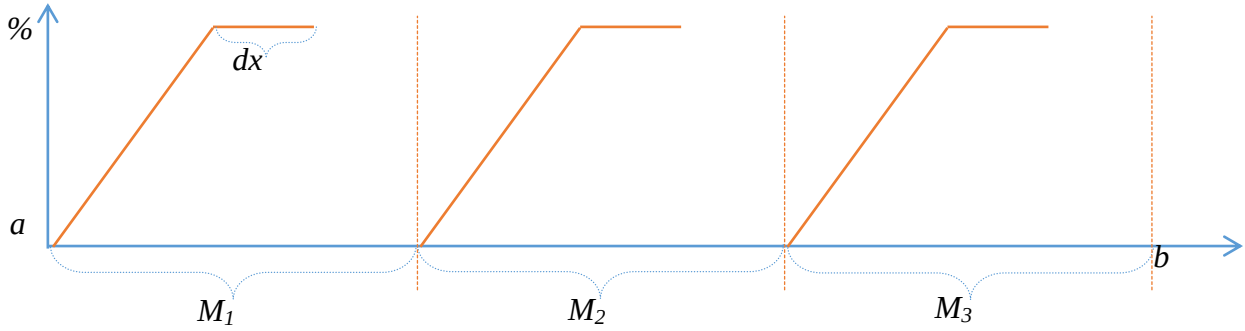
The detected (B) circuit is transmitted to the function of the time $[B^a, B^b]$ interval (d_i) at the current time to find the criticality of the service. The result of a sequence of time sequences is recorded inε_2.



3. Size of services

The time spent by the user for the services is called service capacity. The parameter ofservice capacity is $e_{i,9}=dx\ (dx\geq 1)$To change the value of the service to the value of the parameter dx value service $e_{i,3}=b$ will lose the value of the final execution. The interval is transmittedthat changed to the clock function $[a,b^x]$. Theprocess is repeated for each period,if there is a frequency in the service.

The given $[a,b]$ in result is increased the significance of interval only $[a,b^x]$ part,and the maximum value is given in$[b^x,b]$. The result of the time dimension on the volume of service is recorded inε_3.



4. Service dependency

Indicated service dependency $e_{i,7}=db\ (db\geq 0)$ option other $e_{i,0}$ stores a special service code. If $db>0$, the performance of the service ensures the execution of the other service, if$db=0$, the service is not connected. The interconnection between the services is determined in the following sequence:

1) If the current service $e_{i,0}$ a dedicated service pack for a specific code $e_{J,7}$ connection parameter $e_{J^*,7}$ in the case of elements $J^*$are defined services $e_{J^*,3}$ the maximum value of the time parameter.

$$a^* = \max_{J^*,3}(b)$$

2) Service capacity of the current service $db>0$, then in that case $db$the value is searched by the special code in the service pack. Ifthe result $e_{K^*,0}$ available, K^* services $e_{K^*,2}$it takes a minimum value of the time value.

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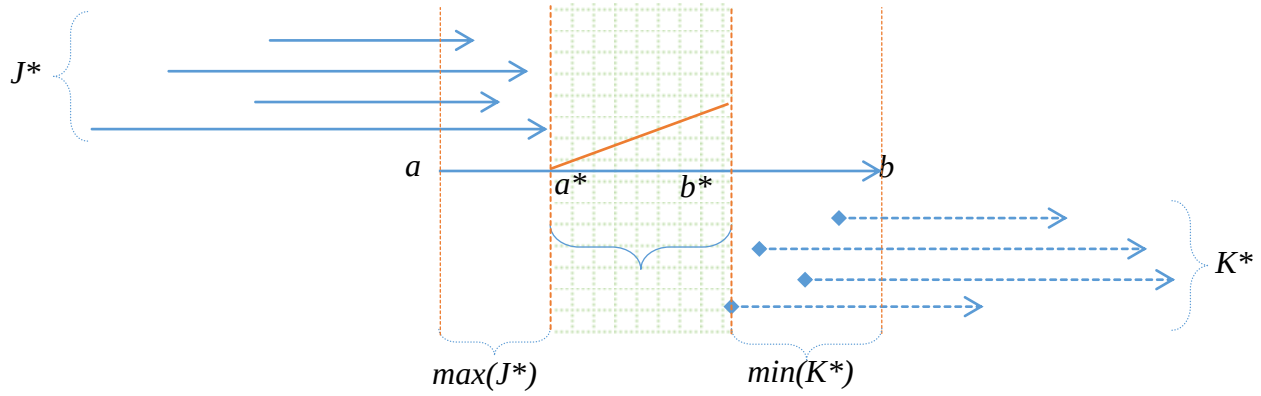
$$b^* = \min_{K^*,2}(a)$$

Detected a^* and b^* values $e_{i,2}$-$e_{i,3}$ the current time value of the service is traversed as a new value ($e_{i,2}=a^*$, $e_{i,3}b^*$) and service $[a^*,b^*]$ interval (d_i) will be passed to the time function to find the criticality of the current service and the result will be recorded inε_4.



The above parameters of the services are transferred to the time function, respectively ε_1, ε_2, ε_3 ва ε_4 percent results were obtained. ε_0 The importance of services $e_{i,15}$the parameter coefficients. This is $\varepsilon=\{\varepsilon_m\}$ re-generate the collection's elements, and one of the following methods is used to determine the current importance of the services.

A) Medium arithmetic $\overline{\varepsilon} = \frac{1}{n}\sum_{i=1}^{n} \varepsilon_i$;

B) Middle geometry $\overline{\varepsilon} = \sqrt[n]{\sum_{i=1}^{n} \varepsilon_1}$.

$\varepsilon=\{\varepsilon_i: i=1..n\}$ because they have a percentage of the elements $[0,1]$ which is added to the service criticality coefficient.

$$\varepsilon = \varepsilon_0 + \frac{\overline{\varepsilon}}{100},$$
$$(0 \le \varepsilon \le 2, 0 \le \varepsilon_0 \le 1, 0 \le \overline{\varepsilon} \le 100)$$

This formula shows the importance of services at the current time.

Identifying the Priority of Service Use

The idea of this mechanism is to provide the user with a definition of a rating of all or a limited number of services by means of variable service coefficients. In order to simplify the construction of the mechanism, we will only see the services provided by *k*.

Rating Function (*Rf*)

Rating function $X=\{x_i\}$ vector x_i elements *Y* sorting by criteria and elements or decreasing in incremental order *m* as a result of which the function returns. The function consists of three arguments: x_i elements, *Y*criteria and *m*Measurement.As a result, the selected *m*elementisreturned.

$$Rf(ext(Y), m, \{x_i\}) = \{\overline{x_j}\}$$

Here if $Y>0$ ($Y<0$) in the interval x_i the maximum (minimum) *Y* close to *m* the selection of each item will be performed otherwise, x_i does not apply to criteria. Also in the function *m*if the argument is not specified or contains 0, the items in the unnecessary collection will only be sorted.This function is used to estimate the rating of service in terms of symptoms.

According to the process diagram, the efficiency of the provided services to users is divided into 3 classes:

- A-class. Services provided by the promotion (11,12);
- B- class. Services provided through functions (13);
- C- class. Directly rendered services (14).

A-*class*. *Effectiveness of the services provided to the promotion*

I. *Determining the rating of the services provided to the jobseekers is to indicate the importance of the services at the current time*e^j magnifications $G_{i,j}^k$ multiplied by the coefficient

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and transferred to*Rf* with the number of important services.

$$Rf(ext(1), m, \{\varepsilon^j \times G_{i,j}^k\}) = \{\overline{G}^k\},\ \ F_1^1 = \cup\{\overline{G}^i\},\ i = \overline{1..k}$$

F_1^1 - effective promotioning services.

II. *Determining the rating of services directly rendered to the job without the assignment of functions*ε^j the importance of services at the current time $V_{i,j}^k$ coefficient multiplied by*Rf*.

$$Rf(ext(1), m, \{\varepsilon^j \times V_{i,j}^k\}) = \{\overline{V}^k\},\ \ F_2^1 = \cup\{\overline{V}^i\},\ i = \overline{1..k}$$

F_2^1 - effective selection of direct services to their functions.

Class A services: $F^1 = F_1^1 \cup F_2^1$.

V class. Services provided through functions

Assessing the effectiveness of the services provided to the user in the function is performed as in the A-class. That is, the importance of ε^j services at the current time is multiplied by $Q_{i,j}$ coefficient k and transferred to*Rf*.

$$F^2 = Rf(ext(1), m, \{\varepsilon^j \times V_{i,j}^k\}) = \{\overline{Q}_{i,j}\}.$$

F^2 - the services that are effective in their functions.

Class S. Directly rendered services

In determining the effectiveness of direct services such as the previous one, the value of ε^j services is multiplied by the W_i coefficient and transferred to *Rf*.

$$F^3 = Rf(ext(1), m, \{\varepsilon^j \times W_i\}) = \{\overline{W}_i\}.$$

F^3 - they are effectively chosen directly from the services.

In general, as a result of the efficient selection of services provided by all classes, all of these services are selected.

$$F = F^1 \cup F^2 \cup F^3 = \cup F^i.$$

The definition of objects and symptoms in the process diagram on the selection of effective IT services ensures consistent feedback on rinterconnection among them.

CONCLUSION

At present time, the criteria used in the mechanism of selecting an effective service, based on user settings, will be the basis for creating an intellectual services module for the IS as a result of the algorithmic implementation of mathematical methods.

We have considered the issue of Intellectual Effectiveness on the importance of electronic services offered to the real-time user in the above IS. In the course of the study, a process diagram that clearly identifies the process of providing the services has been developed, and the definition of the fulfillment of each of the objects and symptoms in this scheme, their aims and objectives and internal parameters have been identified. In accordance with the process scheme, the final indications of the facilities providing services are identified (11-14). The mechanism of change of service delivery has been set up from the effective selection of services. Functions for time function and rating are developed for the mechanism.

The algorithm for altering the coefficient of importance in the service of time function was studied by the frequency and duration of activity, volume and dependence (1). Variable value coefficients of electronic services are correlated with the coefficients of significance in the interval (1-10) of the service user. As a result, different criteria were used in the rating function, and a mechanism for selecting effective electronic services was built.

In summary, the problem of effective selection of electronic services to the user has been solved. The mechanism involved in this effective selection serves as a basis for creating an intellectual system that provides effective IS services.

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