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MODEL OF A VIRTUAL RESEARCH CENTER

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***Abstract*—**This paper presents a general model and the results that allow the construction of a virtual research center. After detailing the processes and the procedures within research centers, it has been developed a model using IDEF0 methodology. This was achieved by abstracting the initial model. The resulting model is based on a theoretical vision of ideal processes that can be developed through a virtual research center. The resulting virtual research center may be implemented and developed in the industrial sector.

***Keywords*—**IDEF, modeling, virtual research centre

I. INTRODUCTION

THIS modeling is performed using IDEF0 methodology, the resulting process model representing the basic processes required. When launching a research topic defining network operating system, includes the following steps:

a. Narrative description and / or graphics
b. Define limits
c. Overall description (using context diagrams (level 0) of languages IDEF 0)
d. The general model of the network -through the inputs and outputs (communication, collaboration, research, information - dissemination, allocation of responsibilities, updating, storing, selecting information)
e. Restrictions used to define system (process)
f. Investigate how the system work (1.2 level diagrams, ... n) of languages IDEF 0.

II. DEFINITION OF THE SYSTEM

The need for modeling a modern research center, in order to match the current trends of faster data generation and ideas is the result of a SWOT analysis and a strategic analysis conducted previously. [1] Having in view the fact that the market is continuously changing, that the customer is the one who comes to the center and that the services provided by the research center must be prompt, with low priced, there results the need of modeling a flexible structure for the research center. The resources (humans and materials) must have the largest possible degree. The research team must be a flexible one, the members can have separate tasks on parts of the project. The scientists, the experts and the customers are direct participants in the act of creation, and hence the necessity to implement the work in network These issues were considered in shaping a new virtual research center (e-research).

The modeling process of an e-research center comprises: [2]

A0. THE MODEL OF A VIRTUAL RESEARCH CENTER
A1. THE DEVELOPMENT OF THE VISION AND THE STRATEGY OF THE VIRTUAL RESERCH CENTER
A 1.1. The Development of the vision
A 1.1.1. Developing the strategic goal
A 1.1.1.1 The design of the desired future
A 1.1.1.2. Design assurance
A 1.1.1.3. Defining the future center
A 1.1.2. Environment analysis
A 1.1.2.1. Analysis of the external environment
A 1.1.2.2. Analysis of the internal environment
A 1.1.2.3. Analysis of environmental change
A1.2. The Strategy of the Research Centre development
A 1.3. Development of the research strategy
A 1.4. Configuration of the management system
A 1.4.1. Establishment / services configuration
A 1.4.2. Identification of the specialists
A 1.4.3. Agreeing the protocols and procedures management
A 1.4.4. Defining the tasks
A 1.4.5. Division of labor
A2: SUPPLY AND MAINTENANCE OF THE ON-LINE SERVICES
A 2.1. Registering virtual services
A 2.2. Providing virtual services
A 2.3. Maintaining virtual services
A3: EXECUTION, DELIVERY AND MAINTENANCE OF THE ON-LINE PROJECTS
A 3.1. Identifying needs / requirements
A 3.1.1. Networking
A 3.1.2. Automatic questionnaires development
A 3.1.3. Fill the questionnaires in network (consumer, specialists)
A 3.1.4. Automatic data analysis
A 3.1.5. Stating posting the requirements on the platform

A 3.1.6. Validation requirements in network
A 3.1.7. Hierarchy requirements using the platform
A 3.2 . e-concept, e-design
A 3.2.1. Identification of the type of solution
A 3.2.2. Highlight requirements
A 3.2.3 Establishing online the key requirements
A 3.2.4 Establishing on-line taken measures
A 3.2.5. Using the creative methods to identify measures constructive platform
A 3.2.6. Using creative methods listed and selecting possible solutions
A 3.2.7. Establishing online the optimal solution
A 3.2.8. Network modeling visualization solution
A 3.2.9. Improving the solution
A3.3.10.Validation the solution through collaborative decision
A 3.3.11. Network View
A 3.3. The project Completion and "dismantling the infrastructure"
A 3.4. Archiving the project and finalizing the contract

III. The Development of the Virtual Research Centre Model

If virtual research center, it is considered a newly established structure that develops in a continuous cyclic process. Whatever of the type of organization, the first steps are identical, the difference being the instruments used to put into practice.

Fig. 1 shows the highest level (A-0) of the virtual research center model. The activity is all actions necessary to manage a virtual platform of a virtual research center, and the modality of using the platform to run a complete project from initial customer requirements at the end of the contract.

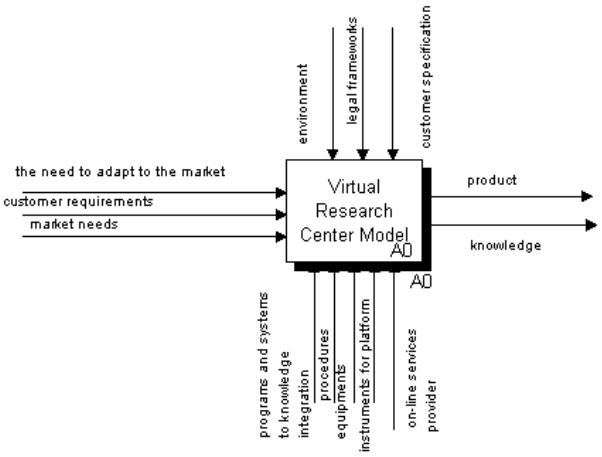

Fig. 1. The Generic Model of Virtual Research Center (A0)

1) General entries are the customer requirements, market needs and the need to adapt to the market.
2) The restrictions are the legal frameworks, environment and customer specifications.
3) The outputs are the product, service or project conducted within the research center and the knowledge resulting from the research accomplished.
4) The mechanisms for achieving the requirements is provided through a virtual platform and an internet provider.

When a virtual research center is created, the needs and the desires of that center should be established as well as what types of activities may be conducted or what products or services may be provided. The structure of the virtual R pattern is shown in Fig. 2.

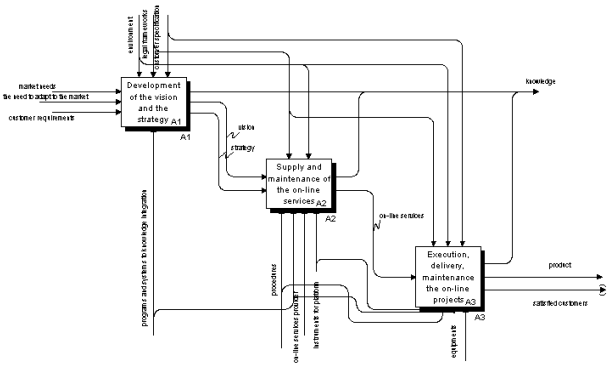

Fig. 2. The virtual research center model

At the stage of development vision and strategy (A1) – it appears the activity of providing online services and maintenance. Implementation mechanisms are the programs and systems integration knowledge, the tools and the platform online service provider.

This activity is splited in actions: (Fig. 3.) development the vision, strategy development of the research center, the development of the research activity and the configuration of the management system.

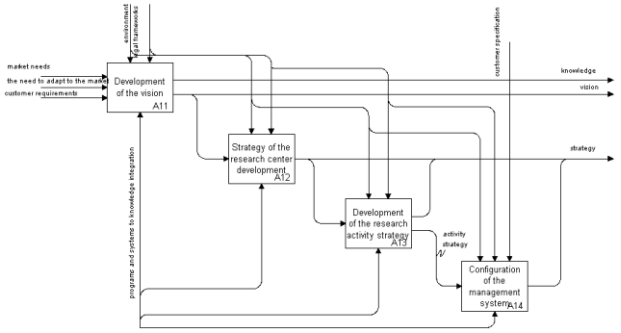

Fig. 3. Development of the vision and the strategy of the virtual research center (A1)

As shown in Fig. 3. the model of the virtual center is relatively simple, there are no many mechanisms or constraints. The only constraints that occur are related to legislation, environment and customer specifications. Modeling the vision and the center strategy are splited in vision development, the development o the research activity strategy and in the system management configuration.

The second action of virtual research center model is the provision and maintenance of the virtual services

(Fig. 4.). This activity (A2) - involving the registration, supply and maintenance of specific center services. The entries are dependent on vision and center strategy. Inputs are "Registering virtual services" and the legal restrictions, environment, customer specifications. The mechanisms for realization of the activity are tertiary service provider, online service provider, platform tools, the shoftwares and the systems integration of knowledge. The outputs of the activity are knowledges (data, performed procedures) and the services provided by the center.

Internet service provider, and virtual platform tools are instruments used to operate in the virtual research center.

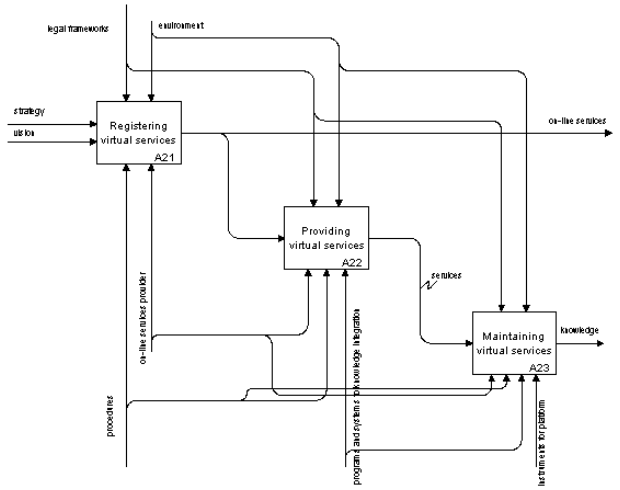

Fig. 4. Supply and maintenance the on-line services

This activity (supply and maintain virtual services) involves the provision and the management of services available through the virtual platform and the knowledge "acquired" during the modeling process. The results is a set of virtual services that are managed and maintained and which are simultaneously entries for A3 module (that of "supply and maintenance of virtual projects"). The on-line service provider, and the virtual platform tools are the mechanisms of work.

The third action of the model - the realization, supply maintenance the online projects (A3), are splited in identifying the needs and requirements, the proper research work called e-design, e-concept, completion project and archiving project. (Fig. 5.)

The outputs of this model are the products (which may be projects, services, products), knowledge acquired, new data for databases (archived projects, customer data bases, etc.) and satisfied customers.

Identifying the needs/requirements (A31) assume the following methodology compose by seven steps. The first step is networking, followed by: automatic drafting questionnaires, filling the questionnaires in network (consumer specialists), automatic data analysis, enunciation and posting requirements on the platform, network validation requirements, prioritizing requirements using the platform.

Organization itself, through the activities and processes of transformation that it includes, represents a set of values for its members, for the shareholders and for the public. The value of the products and the services that the organization provides to satisfy a certain need is extremely important to the customer. [3]

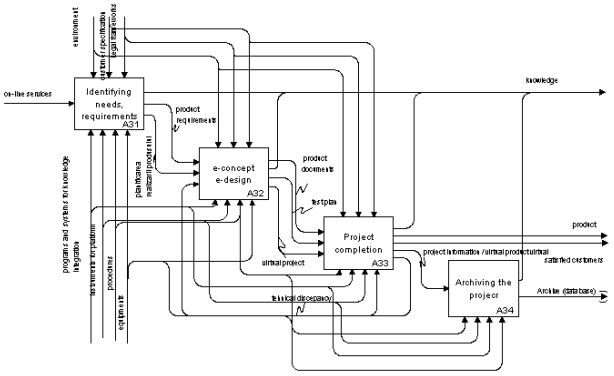

Fig. 5. Achievement, supply maintenance the online projects

The e-concept, e-design model (A32) follows:

a) Identify the type of solution
b) Highlighting requirements
c) Establish the importance of on-line requirements
d) Establish on-line the measures to be taken
e) Use creative methods on platform, to identify the constructive measures
f) Use creative methods to listed and selecting possible solutions
g) Establish online the optimal solution
h) Modeling solution with network visualization
i) Improved solution
j) Validation solution through collaborative decision
k) View Network

Finalize the project and "dismantling the infrastructure" (A33) is the stage where the investigational product are resulting. Here it should be noted that there is a return loop between this and the previous one, due to any technical discrepancies that may occur. All information related to the project (technical details, programs, customer data, database specialists) exiting the virtual completion of the research is the next stage of Entries "archiving project and finalizing the contract" (A34). Archiving these datas are improving the databases of the center.

IV. The Analysis of the Virtual Research Center Model Through Project Management Methodology

Creativity management by objectives can be used in perfect combination with budget management, with participation management and / or one of the other two aforementioned methodologies: projectbased management or product management. [4]

To achieve the analysis of the research center model it proposed to use the methodology of project management. [5]

In this regard it is considered that the construction of new research center is a project that runs virtually all specific stages of project management. It should be noted that there are actions whose duration is variable in this study taking into account the average time required for certain actions. Depending on the type and complexity of the projects or products under investigation in that center, the time varies. In the case of virtual esearch center there are several actions can be carried out in parallel, thus saving time and resources.

It was felt as cross action the virtual services maintenance. The actions such as audit and evaluation activities were considered, also, as cross actions. These are no longer specified in the study. Duration for modeling the virtual center, resulting from the application of project management methodology is 109 days. (Fig.6.)

ID	Task Name	Duration
0	THE MODEL OF A VIRTUAL RESEARCH CENTER	109 days
1	1 SUPPLY AND MAINTENANCE OF THE ON-LINE SERVICES	107 days
2	1.1. Registering virtual services	4 days
3	1.2. Providing virtual services	2 days
4	1.3. Maintaining virtual services	100 days
5	1.4. Finalising virtual services	1 day
6	2. DELIVERY AND MAINTENANCE OF THE ON-LINE PROJECTS	103 days
7	2.1. Contractual agreement	2 days
8	2.2. Project analysis	30 days
9	2.3. Project setup	33 days
10	2.3.1. Establishing the needs	10 days
11	2.3.2. Specialists identification	20 days
12	2.3.3. Agreeing on management protocols and procedures	25 days
13	2.3.4. Defining tasks	3 days
14	2.3.5. Division of labor	3 days
15	2.3.6. Launching the project on-line	2 days
16	2.4. The project achievement	30 days
17	2.4.1. Managing the specialists	30 days
18	2.4.2. Managing the specialists' tasks	30 days
19	2.4.3. Managing the access rights	30 days
20	2.4.4. Use services	30 days
21	2.4.5. Managing the virtual project/service	30 days
22	2.5. The project Completion and "dismantling the infrastructure"	5 days
23	2.6. Archiving the project and finalizing the contract	2 days

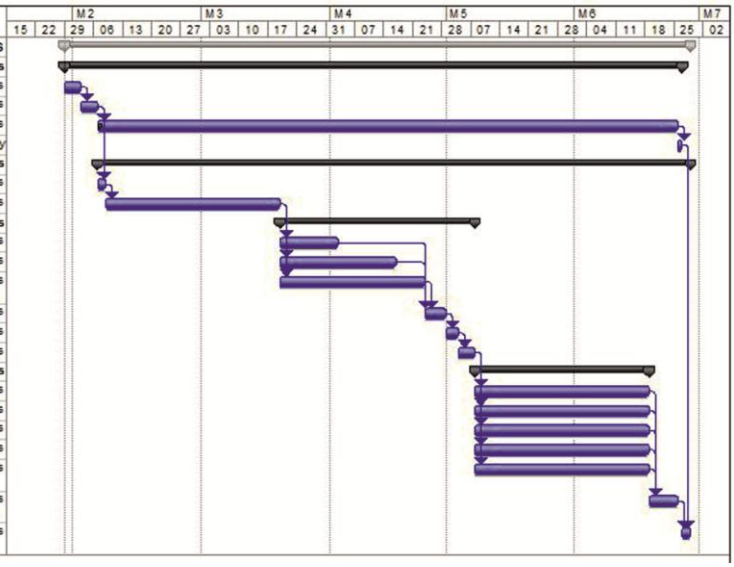

Fig. 6. Improve the efficiency of e-research center in terms of project management

V. Conclusion

This paper presents a general model and the results which allow the construction of a virtual research center. After having detailed the processes and the procedures within research centers, has developed a model using IDEF0 methodology. This was achieved by abstracting the initial model. The resulting model is based on a theoretical vision of ideal processes that can be developed through a virtual research center. The resulting virtual research center may be implemented and developed in the industrial sector. A genuine virtual research center requires specific tools and IT services.

After establishing the framework within which will be held the research activity it is necessary to develop a preliminary model - a pseudo code language for defining the variables and of logical interactions between the components. Regarding the work in network it is necessary to develop a working methodology. After outlining the problem that is intended to be solved and the models to be developed, a complex activity is planning and tracking a project in order to solve the problem detected.

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