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Full Length Research Paper

Assessing organisational virtuality

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A virtual organisation is a network of legally independent organisations and/or individuals that produces products and/or services based on a common business understanding. The characteristics of today's new, virtual organisation forms are that they are dynamic, networked, distributed, flexible, collaborative and innovative, and driven by information technology. Yet the challenge is to scientifically determine which organisation as a subject employs a virtual form and which not. The answer to this question is decidedly complex as most organisations have some virtuality elements that are more expressed than others. Therefore, it is usually only possible to determine how virtual a single organisation is in certain aspects. In this paper we investigate and present all published virtual organisation models that are publicly available in world literature. As none of the available models proved to be applicable for the research into virtual organisations we would like to conduct, we decided to develop a new model for assessing an organisation's virtuality. The purpose of this paper is to present our experience with the design of the new model, which is the framework for our ongoing research.

Key words: Virtual organisation assessment, virtual organisation models, organisation virtuality.

INTRODUCTION

The virtual organisation is a modern organisational construct that allows corporations to face new challenges in a hypercompetitive environment. Three main characteristics distinguish virtual organisations. They do not have a physical presence but exist electronically on the Internet; they are not constrained by legal definitions of types of companies and are formed in an informal manner as an alliance of independent legal entities. This is just the opposite of non-virtual organisations that apply traditional, hierarchical, bureaucratic and co-located modes of organising. A widespread, stereotypical image identifies a traditional organisation with a physical place where people work close to each other. In this ideal organisation, working time is standard, relationships have a long-term orientation, and decision rights belong to the owners and are delegated along a univocal and well-defined hierarchy. On the contrary, in a virtual organisation working time does not matter, relationships are short-term and participants share common and negotiated goals.

As discovered by many researchers, many traditional organisations are gradually transforming themselves into virtual organisations; some intentionally by reorganisation and some spontaneously, driven by technology. DeSanctis, Staudenmayer and Wang (1999) observe that organisational virtualisation is a process affecting four aspects of organisational life:

1. Space: The space dimension refers to the extent of the spatial dispersion of employees across different locations.
2. Time: The time dimension pertains to temporal dispersion, in other words, the degree to which employees operate asynchronously and the duration of relationships.
3. Boundaries: The boundary dimension refers to organisational dispersion: the degree to which organisational processes extend the boundary of the focal organisation.
4. Culture: The culture dimension relates to cultural dispersion: the extent to which an organisation consists

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of employees from different cultures.

The challenge of virtual organization is constant change (Vakola and Wilson, 2004) whilst the change can be twofold. One reveals an ability to enhance organisational efficiency and to achieve greater flexibility of action (Shekhar, 2006). The other shows the dissolution of traditional relationships in the course of realising these desirable ends (Mowshowitz, 2002). It is most clearly evident as an innovation in business management, especially within corporation and in e-Business. Afsarmanesh and Camarinha-Matos (Afsarmanesh and Camarinha-Matos, 2005) believe that effective creation of dynamic virtual organizations requires a proper breeding environment to increase organizations' preparedness.

Organisational virtuality is, therefore, very well defined and understood. Its prerequisites are clear and all the aspects intelligible. Yet a challenge emerges when we want to observe a particular real-world organisation and determine whether it actually employs virtuality as an organisational efficiency improvement tool.

Literature review

An organisational virtuality assessment is a relatively new tool for organisational development that could only take place after the term Virtual Organisation had become very well established. The term itself was coined by its author Abbe Mowshowitz in the late 1970s but was only recognised after several prerequisites for the development of the Virtual Organisation had been met, in particular including the development of modern information technology and telecommunication infrastructure (Mowshowitz, 2003). The term Virtual Organisation is now widely used to identify a new organisational form, but the question is which organisation as a subject employs the virtual form and which not. The answer to this question is decidedly complex as most organisations have forms that are somewhere in a transitional process and it is therefore usually only possible to determine how virtual one organisation is in terms of certain aspects. Several models for assessing organisational virtuality have been developed by many different authors; most of them are briefly presented below.

Models for assessing organisational virtuality

The Switching Principle (Mowshowitz, 1999) is not really a model although it has to be mentioned as it appeared as the first tool used for assessing organisational virtuality. Theoretically, switching is warranted whenever an advantage can be gained by changing the assignment of a satisfier to a requirement. "Advantage" can mean lower cost, better quality, improved reliability of supply etc. Switching can be used effectively in a wide range of business activities from assembling products to structuring an entire enterprise. The possibility of switching undoubtedly adds to organisational and managerial flexibility. The question is just how realistic it can be. Specifically, the basic idea of virtuality is that switching can be done relatively fast and without any significant additional cost. Yet assigning a new satisfier to a requirement may cause changes in accounting systems and databases, necessitate the drawing up of contracts etc. These are the direct costs of switching. There are also indirect costs that arise from the management of a virtually-organised task.

The Model of Business Networking (Klüber, 1998) is a typical representative of models preferred by IT experts as they see virtual organisations through the implementation of Internet technologies like Electronic Commerce (e-Commerce), which is becoming widely understood in the business-to-consumer market due to earlier market awareness of success stories like Amazon.com. The model incorporates important features of virtual organisations that are highly relevant to management. It consists of the following elements: Business Bus (a set of standards), Business Port (interface: an application or service) and e-Service (Internet-based applications and services). Other essential elements of the model are the participants who provide different business services: knowledge, co-ordination, processing, information and transaction services. They are called Integrators and Aggregators.

The TEMPLET Model (Meister, 2000) is a hierarchical model with four major elements: technology, information management, as well as process and organisational capabilities. An organisation's virtual enterprise capability is a function of those four elementary capabilities. The model is not simply additive in that extremely high capability regarding one element does not compensate for low capability regarding another. Indeed, one of the aims of the TEMPLET model is to highlight those areas of competence an organisation needs to develop. The organisation's ability to transform virtuality capability into success would be moderated by factors such as industry norms, rate of technological change and other macro-organisational factors. The guiding principles behind the design process were that the model should be: simple, transparent and easy to change throughout the development process, detailed enough to allow an organisation to identify areas for improvement and applicable to a variety of industries and organisations.

The Three Dimensional Model: "virt.cube" (Scholz, 2000) can be perceived as a complex move along three axes: Core Differentiation, Soft Integration and Virtual Realisation. This theoretically-derived conceptualisation leads to a visual three-dimensional model which shows the existence of various types of virtual organisations. Core Differentiation is a characteristic of the virtual organisation, described by other authors as Core Competencies (Bleecker, 1994; Bavec, 2002). Scholz labelled the first dimension of his model "core differentiation" to indicate that not every attempt to differentiate

automatically leads to a core competence. Soft Integration is about executing the task of integration. Scholz refers to four promising concepts: Co-Destiny, Shared Vision and Goals, Fairness and Trust and Culture of Virtuality. Virtual Realisation is a technological dimension where information technology is the dominant way to accomplish both core differentiation and soft integration.

Modelling with a Radar Chart was developed by Bavec (2002) because of the absence of proven methodologies and indicators for assessing organisational virtuality. For the assessment he selected seven basic characteristics of virtual organisations proposed by Mertens et al. (1998): Boundary Crossing, Complementary Core Competencies, Geographical Dispersion, Changing Participants, Participants Equality, Electronic Communication and Sharing of Knowledge. Bavec ranked each characteristic from 1 to 100 and simply plotted them on a Radar Chart. The result is a clear visual interpretation of the seven selected aspects of a virtual organisation. The level of virtuality can be seen at first glance. The problem with this model is that it does not define how to assess each individual characteristic and how to measure the attained levels.

The Organisational Relational Model was proposed by Migliarese and Ferioli in 2005. They suggest that organisational relationships can be described through four axes: the Tools supporting relationships: inter-personal contacts (periodic meetings, personnel rotation etc.); group management techniques; IT instruments etc.; the Goals shared by organisational actors; the Rules regulating the behaviour of actors within the relationship; and the Cultural Background associated with the relationship: the common assumption reduces the need for negotiation and information exchange (Organisational Culture). In virtual organisations, new Tools for communication or exchange of information are introduced. These tools are the channels through which new and different relationships can be developed. The structure of interests changes when relationships are perceived as brief and members belong to different organisations/individuals. Members' working lives are no longer tied to the destiny of the organisation. Goals must be carefully negotiated in order to consider all the relevant and legitimate interests and to avoid future conflict. A new system of Rules has to be developed by a set of partners who do not know each other. Different Cultural Backgrounds have to be mixed. Languages, cognitive schemes and values compatibility must be evaluated when the virtual organisation is formed and their interaction has to be managed throughout its lifecycle.

While developing *The ISSAAC Model of the Virtual Organisation*, Travica (1999) followed the idea that the model should be: able to determine which organisation is virtual and which is not, able to assess the breadth and depth of virtualisation, accompanied by clearly stated assumptions and definitions that are suitable for guiding research. He selected six basic characteristic of a virtual organisation and called his model ISSAAC after the initial letters of its six dimensions: Interoperability, Special Product, Switching, Anchoring, Aggregation, and Cybernisation. Interoperability refers to the synchronisation of operations with partners involved in a virtual organisation. This includes the domains of communication and co-operation. Special Product refers to the non-standard characteristics of the goods or services delivered by individual members or jointly. Travica (2008) believes that the deliverables of virtual organisations differ from mass-produced ones by being customised, specially ordered, niche-fitting, rapidly developed, or based on a unique combination of competencies. Anchoring focuses on the relationship between the technological condition and organisational strategy, management, organisation of work, organisational values and practices, and political aspects. Aggregation refers to networking electronically with other organisations and individuals to form a virtual organisation and Cybernisation refers to an organisation's functioning in the space that is created by information systems and electronic information flows. Cybernisation reflects the necessary role of information and communication systems.

Comparison and analysis summary

The comparison analysis lead us to the following conclusions and recommendations for practice: any of the presented models can be used to assess organisational virtuality; the different models should be used for different purposes; all the presented models could be further enhanced and it is reasonable to develop a new model that would comprehend the findings of the analysis and bring new value.

METHODOLOGY

Based on the review of all existing models that could be found in the literature and based on the analysis outcomes we established there is a need to develop a new model for assessing organisational virtuality. To be able to accurately assess the level of organisational virtuality we set the following goals for development of the model:

The new model should include the best features of all presented models and contain a classification and interpretation of the results; it should provide a clear visual representation and be practical and suitable for real-life research. It should contain all necessary elements to deliver repeatable results.

Model design concept

We selected critical elements from already existing models and added some new key elements. These elements are arranged in a 3 × 3 Matrix where two dimensions of the element groups are combined together. An intersection in the matrix indicates each element. The values of the elements can have a value from zero to three, indicating the stage of capability to reach the level of virtuality per element. The model describes each individual assessment for every element in detail. The result can be shown in the form of a filled cube that visually displays the degree of organisational

virtuality. In this way a completely full cube represents a completely virtual organisation, while an empty cube represents a completely non-virtual organisation. The visual representation of a completely virtual organisation slightly resembles a Rubik's cube.

Groups

The model is based on two groups of elements (dimensions) of the virtual organisation. The first group – Operations – includes three attributes of an organisation's operations: Technology and Knowledge, Processes and Participants. The second group – Organisation – contains three other attributes: Dispersion, Flexibility and Informatisation. The intersections of those attributes constitute the nine elements of this model, the so-called Growth Pillars of the virtual organisation. Each column can obtain an assessment value (height) from zero to three, with zero in the case of a completely non-virtual parameter and three in the case of a completely virtual level of organisation. Since the virtuality levels of the pillars grow with increased virtuality levels, we have called the model Growth Pillars.

Matrix

The main idea of the model is to divide different features of virtual organisation into two groups that determine either the way they are organised (Organisation) or the attributes of activities (Operations). Each group consists of three attributes which on intersections of the 3×3 Matrix create individual virtuality parameters, as presented in Figure 1.

Pillars

At the intersections appear nine different elements, namely the Growth Pillars:

1. Informatisation of Technology and Knowledge relates to the level of information technology capabilities and the level of use of electronic communications.
2. Informatisation of Processes is an element that allows the technology to traverse to other locations and participants. Virtual organisations can only function effectively if they have the processes identified, described, standardised and supported by modern information technology.
3. Informatisation of Participants describes the extent to which individual participants are equipped and trained with information technology. Given the dispersion of the participants, they must have autonomy and an ability to work independently.
4. Dispersion of Technology and Knowledge is historically the first significant element of the virtual organisation that Mowshowitz first noticed with the migration of production to locations with lower production costs. In modern virtual

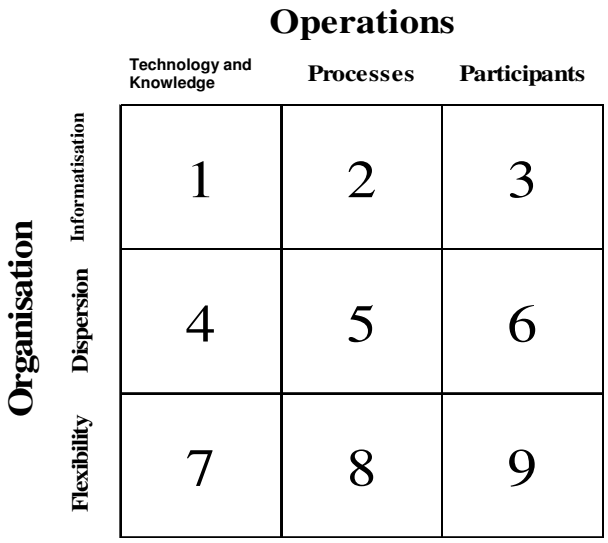

Figure 1. Growth Pillars 3×3 Matrix.

organisations it is a very significant element since their technology is usually scattered all over the world.
5. Dispersion of Processes follows the dispersion of technology. In the progressive transfer of business elements to other participants (partner organisations, outsourcing partners and individuals), virtual organisations must also ensure that they transmit the relevant processes appropriately. Processes undertaken by the different members of the virtual organisation must be clearly defined and managed (Trkman, 2010).
6. Dispersion of Participants is a very typical and one of the most easily measurable elements of a virtual organisation. It can be measured by the number of different locations, as well as the proportion of participants that are engaged outside the central location of the organisation.
7. Flexibility of Technology and Knowledge is an element which will determine how far and how fast the technology of an organisation can adapt to current needs. Flexibility of knowledge is a highly expressed element of virtual organisations as they can rapidly adjust their knowledge structure with a change of participants (Škerlavaj, 2010).
8. Flexibility of Processes represents the processes that are designed for continuous adaptations to current needs. Virtual organisations need a very high level of the definition and standardisation of their processes. Flexibility of processes is the element of flexibility that follows the flexibility of technology and knowledge. It is also a precondition for the geographical dispersion of participants.
9. Flexibility of Participants is a key element in the effectiveness of virtual organisations. It is also one of the most critical ones since the participants as individuals face many difficulties in adapting to such a mode of organising. Individuals require a certain degree of entrepreneurship and ability for self-employment. The problem

Table 1. Levels of Virtuality.

Level	Value/Score	Description
1	0–2	A completely non-virtual organisation
2	3–5	A non-virtual organisation
3	6–8	An organisation with a few virtual elements
4	9–11	An organisation with some virtual elements
5	12–14	An organisation with more virtual elements
6	15–17	A partial virtual organisation
7	18–20	A moderately virtual organisation
8	21–23	A mostly virtual organisation
9	24–26	A virtual organisation
10	27	A completely virtual organisation

Table 2. Virtual or non-virtual organisation.

Level	Value/Score	Description
1.	0–20	A non-virtual organisation
2.	21–27	A virtual organisation

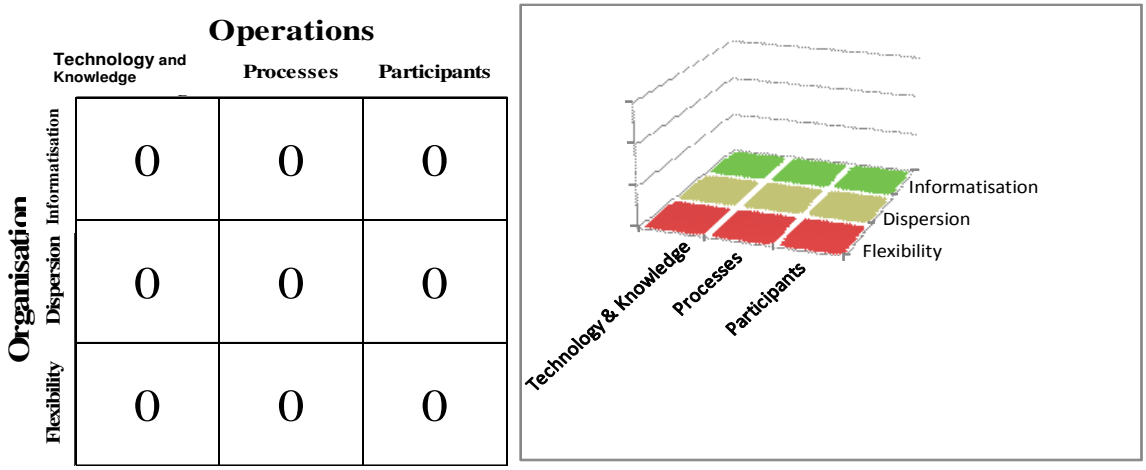

Figure 2. Virtuality assessment of a hairdresser.

problem of trust must also be considered and addressed.

Assessment and classification

For practice we have developed a questionnaire which describes in detail each value from zero to three for each individual pillar (Weber 2010). All values obtained from the questionnaire have the same weight. For classification into levels of the organisation's virtuality we simply add up all the values and compare them with Table 1.

Even if we only need to classify an observed organisation as virtual or non-virtual, we can define a breaking point of the assessment at a value of 20/21, level 7/8 as shown in Table 2.

Practical examples

1. A hairdresser; a small hairdressing salon with a few employees. The virtuality assessment score is 0 as seen in Figure 2. It is a typical representative of a completely non-virtual organisation.
2. Travel Agency; a smaller travel agency with up to 10 offices. The virtuality assessment score is 11 (Figure 3), which positions it as an organisation with some virtual elements.
3. Vehicle Manufacturer; a major serial production vehicle manufacturer focused on one continent, with fully automated production (e.g. PSA). As can be seen in Figure 4, the level of virtuality is 18, placing it in the moderately virtual organisation class.

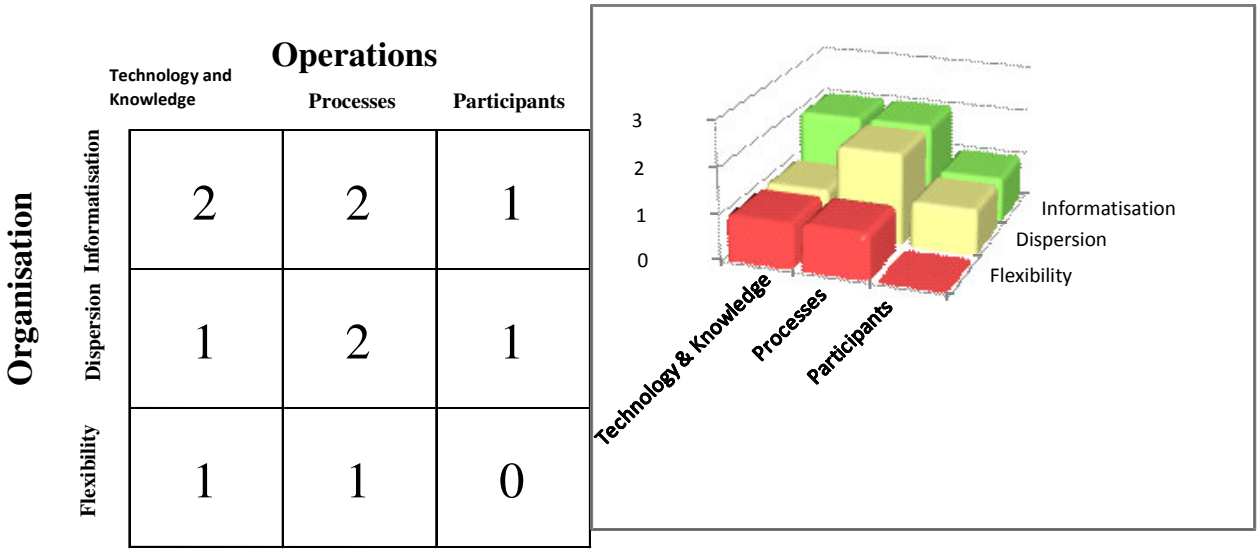

Figure 3. Virtuality assessment of a travel agency.

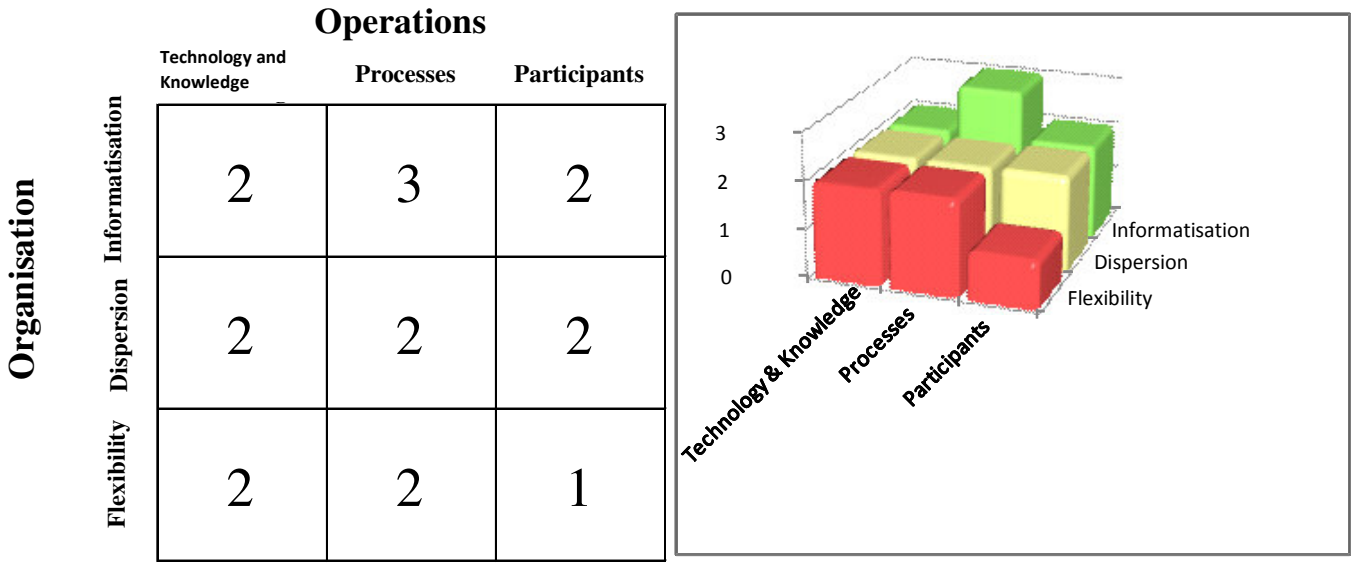

Figure 4. Virtuality assessment of a vehicle manufacturer.

4. Web Encyclopaedia; a global web organisation with a large number of participants, such as Wikipedia. The level of virtuality is 25 (Figure 5), making it a virtual organisation.

Conclusion

In this paper we have presented a model for assessing organisational virtuality that is practical to use, suitable for research into any specific organisation that delivers repeatable results, offers a clear visual representation, and for the first time includes a classification and interpretation of the results. The main benefit of the model is that it is universal and could be used by any researcher, academician, consultant or expert, who would like determine the level of organisational virtuality of any particular organisation. It is a new concept that resolves one of the open questions in science, namely how to assess organisational virtuality and benchmark an organisation with other organisations, particularly competitors in the industry.

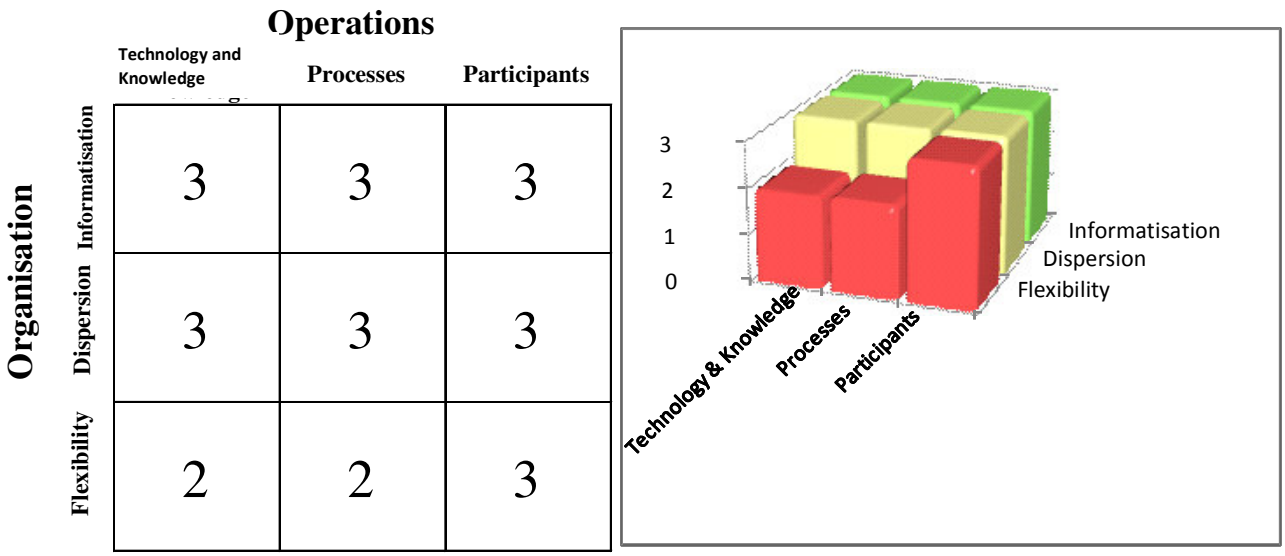

Figure 5. Virtuality assessment of a web encyclopaedia.

We have used the model as a foundation of our ongoing research which is investigating the impact of the virtuality of an organisation on its performance. The research is not yet completed, but ongoing study proves that the model meets all expectations set. The respondents of the survey that requested their evaluation and commented the assessment of their organisations have been generally very satisfied with the results and presentation.

One of the side results of this study, along with a new model for assessing organisational virtuality, is a detailed questionnaire (Weber, 2010) concerning organisational virtuality and effectiveness which allows an organisation to determine weak points of its various organisational parameters. It can also be used by management consultants to help various organisations boost their organisational effectiveness.

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