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*Designing and managing an effective corporate governance structure for Virtual Breeding Environments (VBEs) is a challenging process. Therefore, a governance model is required to define operational rules, bylaws and principles that will govern the behaviour of the members of a VBE during its life cycle. VBE governance will help to define who can make what decisions, who is accountable for which effects, and how each of the VBE actors must work to operate the VBE management process effectively. This paper presents first attempts in the definition of guidelines for Governance Rules and Bylaws in VBEs.*

## 1 INTRODUCTION

Virtual Breeding Environments (VBEs) represent a group of organisational entities that have developed preparedness for cooperation, in case a specific collaborative opportunity arises or is identified by one member (acting as a broker). Therefore, such form of organisation, also known as a source network, is considered as a pre-condition for effective establishment of dynamic virtual organisations. Furthermore, VOs are temporary alliances of organisations that come together compromising their resources and skills in order to respond collaboratively to a competitive market opportunity, and its interaction is supported by computer networks (Camarinha-Matos and Afsarmanesh, 2006).

This paper describes main elements involved in VBE governance through a set of guidelines for defining the breeding environment governance, including internal operational rules and bylaws. Some of these elements include: membership, incentive and sanction system, ethical code, VBE culture, administrative functions in order to identify priorities, roles and responsibilities, and bases for decision making in managing sphere during VBE lifecycle stages.

## **2 BASIC CONCEPTS ON GOVERNANCE**

The governance word derives from Latin origins that suggest the notion of “steering”. It refers to the “use of institutions, structures of authority and even collaboration, to allocate resources and coordinate or control activities in societies or economies”. In general terms governance occurs in three broad ways: a. through top-down methods that primarily involve governments and the state bureaucracy, b. through the use of market mechanisms where market principles of competition are employed to allocate resources while operating under government regulation, and c. through networks involving public-private partnerships or with the collaboration of community organisations.

Good governance structures encourage organisations to create value (through entrepreneur, innovation, development and exploration) and provide accountability and control systems commensurate with the risk involved (Kumar, 2005).

Governance refers to the act of affecting government and monitoring (through policy) the long-term strategy and direction of an organisation. In general, governance comprises the traditions, institutions and processes that determine how power is exercised, how citizens are given a voice, and how decisions are made on issues of public concern (Graham et al 2003). VBE governance is specifically aimed at facilitating and improving processes of business opportunities approaching, as well as guaranteeing the sustainability and correct performance of all stakeholders involved. It is concerned with the questions: how the value chain itself is moving, how it can be reconfigured and where possible new synergies can be found (Gilsing, 2000).

There are several governance models, some of them related to the governance of a nation, while others are related to the governance of an organisation. Some aspects that governance models respond are mainly related to next questions: what to do, how to do it, who should do it and how it should be measured (GGB, 2002).

Principles are the values that govern a person or organisation’s behaviour. In this case they will be defined as the result of a vision, something that a VBE, wants to reach. They constitute the main guidelines for breeding environments on a macro level. Key elements of good governance principles include honesty, trust and integrity, openness, performance orientation, responsibility and accountability, mutual respect, and commitment to the organisation.

Rules refer (formally or informally) to various types of guidelines (i.e. direction, standard, method, operation) or standard (i.e. definition, fact, law, code, truth, etc.). Maintaining the VBE as a sustainable organisation requires the performance of some important processes which will be created, monitored and controlled through definition and application of operational rules for each one.

Bylaws are generally understood as the document adopted by an organisation to regulate its affairs; formally referred to as the rules of operation. Bylaws should include the following: organisation mission, membership policy, meeting information (attendance requirements, number that constitutes quorum), organisation board (number of members, responsibilities, special roles, officers and their responsibilities, length of terms), committees and their functions, fiscal year accounting procedures, indemnification, bylaws amendment procedures, and dissolution of organisation.

### 3 GUIDILINES FOR DEFINE VBE GOVERNACE

This section presents an approach to guide the creation of VBE governance rules, involving both operational and behavioural structures. The relationships among governance concepts are presented in the Figure 1.

The top level defines the strategic plan for VBE governance, establishing the principles as a result of a vision, where objectives that the VBE wants to reach are depicted. The definition of rules includes both behaviour and function related rules. Behaviour rules, such as ethical code, and VBE culture, are related to social values. VBE governance can be supported by ICT tools that facilitate the implementation of related rules and principles.

Rules and bylaws for breeding environment should be initially defined by a VBE manager together with VBE members and VBE advisor. During VBE operation the VBE manager and VBE members can propose rules, laws and bylaws that must be considered during the creation of VOs. Definition of rules and bylaws will depend on the specific sector of the VBE. However, there should be a procedure that defines the creation and inclusion of new rules; new rules must be evaluated according to bylaws defined.

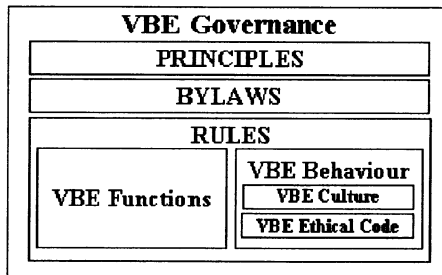


Figure 1 – VBE Governance Model

#### 3.1 VBE Principles

Since principles are described as values that govern the stakeholders’ behaviour within an organisation, they are most referred to the social attitudes which will obviously impact its operational performance.

Some general principles will be enumerated in Table 1 order to establish the social model that should be part of VBE governance body:

Table 1 – Guidelines for VBE Principles

<b>Honesty</b>	Acting with loyalty, with good faith for all stakeholders benefit.
<b>Trust and integrity</b>	Being part of the VBE gives rights to members, but also allocates some duties where trusted collaborative network is the fundamental key.
<b>Openness</b>	The value of sharing information and collaborate in business opportunities will reflect the openness of VBE members.
<b>Performance orientation</b>	The good performance in the VBE related area, as well as high quality levels and social attitudes allow companies to keep the membership and deserve rewards, and invitations to participate in new opportunities.

<b>Responsibility and accountability</b>	Respond with assigned tasks, actively participate in coordinated work.
<b>Mutual respect</b>	The coordination for collaborative work will have diverse opinions for creation or development of any task, those opinions must be carefully analysed and respected during agreements. Not only cultural and ethical issues are involved in mutual respect, but also technical elements.
<b>Commitment to the VBE</b>	Understand that the breeding environment growth together with the improvement of the company.

### 3.2 VBE Bylaws

Principles and rules represent a general and global schema under which a VBE will control and monitor the performed activities along its lifecycle. The definition of Bylaws for a VBE represents the formal documentation of principles and rules that govern VBE members' behaviour.

Structured governance bylaws for any VBE will define regulations for its affairs; however, those regulations must aim to a common objective in order to guarantee reaching of goals and achievements depicted in VBE mission and vision. The specific mission and vision for each VBE should be developed during the definition of its business model.

Main proposed section for VBE bylaws is described in Table 2:

Table 2 – Guidelines for VBE Bylaws

<b>VBE Bylaws</b>	
<b>Rights and Duties policies</b>	During the VBE creation process, the actors of the VBE and their roles must be identified. The main actors identified are: VBE member, VBE administrator, VO broker, VO planner and the VO coordinator. Other participating stakeholders to support the performed activities are the VBE advisor, supporting institutions (i.e. common tools/services provider, SMEs, industrial association, chambers of commerce, regional development agencies, universities, government entities) and a common ontology provider. It is important to characterize the management board of the VBE as well as define its responsibilities. The board can be formed in first instance by the VBE manager, brokers, some VBE members, and the VBE advisor; and it could be modified according to the internal policies of each VBE, these policies should be formally described in the bylaws document.
<b>Membership policies</b>	<p><i>Qualification criteria and associated processes:</i> Define what kinds of organisations will form the VBE, how to evaluate them in order to reward or sanction its performance. Policies to accept new members or retreat old ones must be clearly defined. The acceptance of new members in the VBE requires a prior evaluation of the organisation that includes the following issues, among others: profile, record of performance, products, processes, delivery time, quality, etc. Before the establishment of VBE, the potential members must be aware of the working policies, like membership agreements which would content: Benefits, potential incomes for participating on the VBE, duties, subscription process, and qualification criteria, among others. Every process necessary to clarify roles of each involved party for different activities should be detailed.</p> <p><i>Membership control and governance:</i> Specific policies and rules must be also defined for the maintenance and control of VBE membership. It includes the creation of an Incentive and Sanctions System that will act as an enabler for managing activities, allowing the manager to make decisions about sanctioning, retrieval or rewarding members.</p>
<b>Incentives</b>	The definition of a system of incentives is important for attracting and maintaining partners and members. In general, for business related contexts, the key incentives to participate in a VBE are business benefits and knowledge.

<b>Sanctions</b>	VBE members could be also punished if they fail to adhere to the defined rules and principles in the VBE (i.e. not adhering of VBE code of ethics, not adhering to the VBE contracts and agreements, low performance of the VBE member according predefined goals of performance indicators, not being truthful on their reporting to the VBE, etc.). Similarly some rules must be established for accepting and retreating VBE members (i.e. the selection process should include quality tests, samples and performance indicators). For retreating any member it must be considered the type and effect of the fault committed, thus an order for faults and their sanctions must be structured.
<b>Security Issues</b>	Policies to safeguard the confidentiality of gained information and obtained knowledge must be defined prior to operations of the VBE; these aspects should be included in the ethical code, and will be part of the incentive and sanctions system since the information management from a member gives drivers to make decision about it (retreats, renewals). Members are obligated not to disclose confidential or private corporate knowledge or information to competitors. The definition of the confidentiality is really important within the VBE (What kind of information about their company partners must share with the other partners of the VBE?), between the VBE and the Clients (Who can have access to the information of the clients? Is the client allowed to know who the different partners of the VO are?), and between Clients and VBE.
<b>ICT use guidelines</b>	This element is related to the use of technology as a mean to disclose and share the information, respecting the policies and rules, according to the ethical and behavioural code (see Section 3.4).
<b>Conflict resolution policy</b>	Possible conflicts and disputes presented among members will be worked out by the board, headed by the VBE manager with the support of a VBE advisor, in presence of involved parties. In case of not solving the problem according to internal VBE bylaws, it will proceed to take the case into the legal statements. The most relevant cases that could introduce conflicts to the VBE are: breach to a contract, disclose of confidential information, use VBE means for approaching particular interests external to the VBE, intellectual property rights (in case of patents), among others.
<b>Financial policies</b>	Even for non-profitable VBEs, it is necessary to build a sustainable organisation; it means that policies for payments and an accounting structure must be defined in order to guarantee a potential growth at economic level.
<b>Amendments to bylaws</b>	Bylaws are subject to amendment at any regular meeting of the Management Board. Notice of proposed changes in the rules should be circulated to all VBE members with a considerable time in advance of the meeting at which they are to be acted upon. Changes in the bylaws require consensus. Any changes in the bylaws approved by the management board should take effect according to the rules defined.
<b>Intellectual property rights policies</b>	Intellectual property rights must be defined when the VBE will be launched. Definition of owner of rights (sharing patents, selling or licensing patents) is a task for VBE manager advised by a supporting institution (preferably an external member of the VBE).

Guidelines described above represent a general approach to guide the process of defining principles and bylaws in a VBE, however bylaws that will govern the internal structure and functioning of the VBE will depend on the specific sector where it will perform its activities for (i.e. a service VBE will necessarily have to manage different processes than a manufacturing VBE, and the principles/bylaws defined should be guided and supported by this processes).

Other important issues to bear in mind, when defining VBE principles and Bylaws are: representation of those global and common activities for any VBE creation and/or operation, administration processes (accountability), management roles nomination and renewal processes, contract enforcement policy, and purchasing and management of outsourced services.

### 3.3 VBE Rules

VBE rules can be divided in two groups: rules related to the behaviour of VBE actors and rules related to functions or processes of the VBE (see Figure 2). Next sections will depict some guidelines for defining these types of rules.

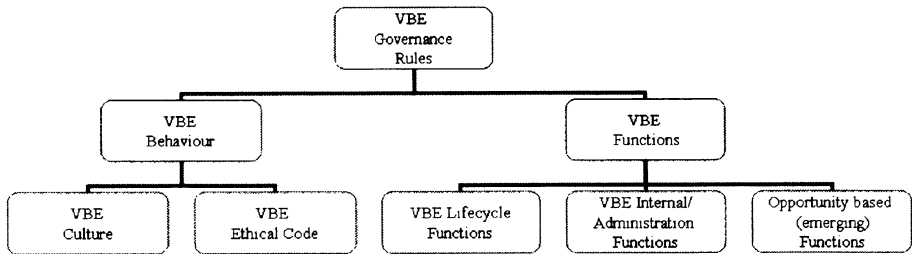


Figure 2 – VBE Governance Rules (operating/functioning)

#### 3.3.1 VBE Behaviour

General rules must be defined within a frame that involves behavioural rules, which includes the VBE culture and ethical code. Ethical behaviour support trust building process which will guarantee the social and operational sustainability of the breeding environment.

##### VBE Culture

The culture of a group can be defined as: “a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems” (Schein, 1992). Among other factors, the primary requirements for a proper collaboration culture in a VBE can be associated to the guidelines presented in Table 3:

Table 3 – Guidelines for VBE Culture

<b>Commitment</b>	In order to be trusty, a level of commitment is required. This can be measured based on previous work like accuracy of service times of an enterprise with its clients or with its partner’s previous alliances.
<b>Leadership</b>	Organisations should focus on their core competences to achieve market leadership. This idea can be generalized for a VBE, where enterprises collaborate to obtain a recognized level of quality. The vision of being one of the best should be constant in the environment and to differentiate from competition should be also a common mission.
<b>Trust</b>	Trust is a basic element in VBE culture. Trust can be developed via formation of alliances, consortiums, associations, value chain integration, among others.
<b>Self-Learning</b>	Self-learning related to the ability of organisations and individuals to learn by their selves. Self-learning supports VBEs sustainability.
<b>Long-term and Global Vision</b>	A VBE should have a defined long term vision, which will guide its activities according to the strategy defined by the organisation. The activities performed in the VBE should be aimed at results and profitability in long maintaining VBE operation. This vision should consider the global market aspect, especially for the development of dynamic VOs.
<b>Effective Communication</b>	VBE members must use proper communication ways and tools. Communication includes aspects related with information sharing and knowledge sharing.

<b>Innovation</b>	The ability to be creative in products, process and services is the base of innovation. VBE actors should involve innovation in the execution of its activities. Innovation should be present during VO creation, operation and dissolution.
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In conclusion VBE culture comprises all organisation's beliefs, knowledge, attitudes, and customs. Culture may result in part from managers' beliefs/thoughts, but it also results from VBE members beliefs (opinions/approaches). It can be supportive or unsupportive and positive or negative and it also can affect members' ability or willingness to adapt or perform well.

### *VBE Ethical Code*

An ethical behaviour (accepted standards of conduct) expected from members of VBE will determine in certain way the feasibility for a member to form part of a VBE. Some important deontological values to be evaluated during all VBE operation (PVC ethical value based – general values) are:

- Sharing attitude: All collaborative business forms requires a special thinking for sharing knowledge, opportunities, contacts, resources, etc.
- Awareness for win-win development of business opportunities, where organisation does not only want to obtain benefits from others, but also to give and share things with others (no opportunistic behaviour).
- No discrimination, “knowledge” and “collaboration attitude” based enterprise valuing (enterprise recognition).
- Enterprise strategic advantage through collaboration.
- Recognition of merits for self-organizing leadership (for instance, the member which brings in the business opportunity is empowered to lead the virtual organisation build up).

### 3.3.2 VBE Functions/Operational Rules

These rules support both operational and administrative processes along all VBE lifecycle stages. Table 4 proposes a general guide to establish the most important operational rules for a VBE that support right activities execution.

Table 4 – Guidelines for VBE Operational Rules

<b>General Management and Support Process</b>	
<b>Rule</b>	<b>Description</b>
VBE management processes (how the VBE will be managed, decision making principles)	The decision making rules should be established by a VBE management board where manager and advisor will play a relevant role as experts and enablers for definition of concerned rules.
Administration processes (Accountability)	Accounting processes will be responsibility of a statement created to support in financial issues, and monitored by VBE manager.
Management roles nomination and renewal processes	Assignment of responsibilities and roles, for different actors and members, as well as tasks to be performed and their management represent one of most important elements in VBE lifecycle.
Policies for code of conduct - Ethical Code	Defined policies and norms related to these behavioural aspects should be described as an independent document; these rules also embody the social value for VBE.
Conflict resolution policy - Dispute Management	For both, ethical and technical disputes among VBE members (or any stakeholders) and the definition of manners how they will be worked out must be depicted.

Contract enforcement policy	The policies for sanctioning those members that does not apply contracted terms with VBE are described in the incentive and sanctions system.
Purchasing and management of outsourced services	Define specific rules for outsourced services; these rules must be in accordance with general principles and bylaws.
ICT principles and security policies	Allocating the roles and rights for each member; and access level for ICT tools and responsibility in its utilization.
<b>Business Process Management</b>	
<b>Rule</b>	<b>Description</b>
Collaborative Opportunity qualification (scope compatibility control)	According to the characteristics of VBE to be created, it is necessary to evaluate the competences of potential partners, and identify the scope of process and performance, naming rules that constrain the qualification of collaborative opportunities development.
Commercial processes	Policies related to sales, and establishment of business relationships, contacting, and how to disclosure obtained information, are issues to define related to commercial processes.
Marketing	Rules related to marketing activities, success projects progressing, brand, recognition and prestige. VBE launching will need publicity campaigns and use of different communication channels to introduce the concept into the market and industry. Rules to govern the marketing should be defined for each VBE.
Responsibility	The rules to define and allocate roles and responsibilities for all VBE actors correspond to proper bylaws in each VBE. A general description about responsibility management and assignment.
VO constitution process	How to select and evaluate partners, contracting process, and operation principles definition are some rules to establish for VO constitution process.
<b>Membership Management</b>	
<b>Rule</b>	<b>Description</b>
Membership qualification criteria and associated processes	Selection of partners that will be members of the VBE. Qualification and evaluation criteria in order to avoid partial and unfair preferences.
Membership agreements (benefits and dues) and subscription process	Before becoming member, each organisation must know benefits, liabilities and rights when participating in a VBE.
Member profiles management	Requirements and functionalities to be governed are described in a profile and competency management System, and rules to update information in the system
Members' internal evaluation processes	Some rules to assess the performance of the member as well as social elements that affect VBE work; must be defined. Metrics to measure performance, trust and value generation, will address the conformation of an internal evaluation process.
Membership control and governance	The incentive and sanction system defined through the identified metrics will facilitate decision making about memberships concession or retirement.
<b>Knowledge Management</b>	
<b>Rule</b>	<b>Description</b>
Information sharing	Rules related to exchanging information, and sharing experiences and business opportunities.
Community Body of Knowledge management processes	Collecting, maintaining and enriching the knowledge body are the main goals to be achieved through definition of rules that focus on them.
Internal projects for Knowledge creation	The challenge is to identify where the knowledge is created, and from there to generate applications or models to keep, and enlarge it. Rules related to this process should also be defined.
Intellectual Property Rights management rules	IPR is an important issue to be considered when the VBE is operating. Define the owner of rights (sharing patents, selling or licensing patents) is a task for VBE manager advised by a supporting institution (preferably an external member of the VBE).



Members' general interaction	Cultural values combined with ethical attitudes, and supported by a good technical performance, allow members to generate an identity where they will follow and operational rules, breeding a good interaction environment.
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Most tasks for defining VBE governing are given to VBE manager and VBE advisor (for instance a specialized professional in laws, or an experienced support institution as consuler in network management). The VBE manager is in charge to administrate all tasks for the right daily performance of the VBE (assignment & reassignment of responsibilities, conflict resolution, making common VBE policies, etc.). The definition of specific governance rules will depend on many criteria as VBE type, amount of members, past performance records, among others.

### 3.4 Governance and ICT support tools

The need for a collaborative space where rules and principles can be published and improved, and where vision, strategies and decisions can be shared, makes to think about some web-tool which could help to solve this problem. A CSCW (Computer Supported Collaborative Work) tool could be one solution to share and promote governance rules and principles. Nevertheless, further research is required in this subject.

## 4 CONCLUSIONS

The VBE Governance can be defined as the people, policies and processes that provide the framework within which managers make decisions, negotiations and accommodations between parties involved and take actions to optimize functionalities, relationships and performance. In general all outcomes related to the spheres of responsibility inside the Virtual Breeding Environment.

The VBE bylaws will need to be written down in document that will contain the ground rules by which a breeding environment will be run. Bylaws normally establish such matters as the titles and duties of the VBE actors, the timing and procedures for collaborative opportunities, and the manner for conducting the VBE administration.

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