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# Entrepreneurship encouragement and business development support at universities and science parks. Proposal for a new conceptualization

**Mónica Arroyo-Vázquez and Peter van der Sijde**

**Abstract:** *New stakeholders and new roles for old stakeholders have emerged with the development of entrepreneurial universities. A new systemic framework is therefore required which includes these various stakeholders and their goals and thus gives a clear picture of the process of entrepreneurship encouragement and business development support (EE&BDS). The authors propose a model for knowledge transfer and company growth in the context of entrepreneurial universities and science parks. This integrative approach to the roles of the different stakeholders, activities, tools, goals and needs facilitates the arrangement and management of the EE&BDS process. The authors describe and assess their EE&BDS model, presenting the case of the Polytechnic University of Valencia (UPV) and the science park linked to it, the Polytechnic City of Innovation (CPI). The analysis identifies the roles of and relationships among the UPV-CPI stakeholders and shows how this integrative approach can enhance the EE&BDS process for the institution.*

**Keywords:** *entrepreneurial university; entrepreneurship education; business development support; science parks*

The role of the university is no longer restricted to teaching and research (Etzkowitz, 1998): universities are now expected to become significantly involved in economic and social development. This additional

demand has resulted in the rise of a new type of institution – the entrepreneurial university – which combines and integrates the traditional activities of teaching and research with a contribution to economic

and social development (Etzkowitz, 1998; Goddard, 1998). Such entrepreneurial behaviour was studied by Clark in both European universities (Clark, 1998) and universities around the world (Clark, 2004). He identified five elements critical to the transformation from traditional to entrepreneurial university (these are detailed in the next section).

In this context, a key aspect of the entrepreneurial university is its entrepreneurship encouragement and business development support (EE&BDS) process. A factor that must be taken into account in this process is that an entrepreneurial university brings with it new stakeholders and new roles for existing stakeholders. The specific objectives of these various stakeholders need to be integrated with each other so that all can work towards a common institutional goal in terms of entrepreneurial development. To enable this to happen, a new systemic framework is required (Clark, 1996; Etzkowitz, 2003) which will incorporate the different stakeholders and their goals and convey a clear vision of the EE&BDS process at universities and their science parks.

In this paper we present a model for the EE&BDS process in entrepreneurial universities in which science parks can play a key role. This model builds on the experience of Nikos<sup>1</sup> and its conceptualization of the entrepreneurial process (see, for example, Kirwan *et al*, 2006) and positions stakeholders and actors such that the EE&BDS process is optimized (see, for example, van der Sijde *et al*, 2002). The proposed model focuses on four key areas that universities and science parks will need to foster:

- entrepreneurship culture;
- entrepreneurship support;
- new business launch support; and
- business growth support.

The model helps in identifying a mechanism for satisfying entrepreneurs' and business needs, and the optimal timing for this, and thus constitutes a new analytical tool.

In this respect, our research question can be posed as follows. To what extent is our analytical model a helpful tool for implementing the EE&BDS process in universities and science parks? To answer this question, we present a methodological approach which is used first to analyse which stakeholders are involved and how they satisfy the needs of entrepreneurs and business and second to ascertain whether all those needs can be satisfied with the application of the EE&BDS model.

The translation of the model from theory to practice will provide us with accurate data that will enable us to identify the strengths and weakness of any EE&BDS

process undertaken, and so to design appropriate tools and activities that will actively support the process.

In order to test how it works in practice, we apply the EE&BDS model to the case of the Polytechnic University of Valencia (UPV) and its related science park, the Polytechnic City of Innovation (CPI), both located in the Valencia region of Spain. We show how the different stakeholders are able to work together using networks and with entrepreneurial behaviour in order to achieve their respective goals. In this respect, the proposed model is based on communication, collaboration and a shared framework; it will therefore succeed only if the stakeholders work in networks and with entrepreneurial behaviour. In addition, we have to bear in mind several challenges in applying the model: we detail these in our application of the model and propose responses to them.

In the next section we discuss theoretical approaches to EE&BDS at entrepreneurial universities and present the aim, logic and development of our integrative model. We then address the proposed methodology using the case of UPV-CPI. Finally, we summarize the outcomes and offer our conclusions.

## **An integrative approach to EE&BDS**

In this section we introduce our integrative approach to the EE&BDS process in entrepreneurial universities (including science parks). First, however, we explain the rationale behind the approach by setting out the context in which it has been developed.

### *Framework and context*

The nature of the university's contribution to society has long been the subject of debate and is again receiving much attention from researchers and policy makers. The notion of the 'entrepreneurial university' (first mooted by Davies, 1987) has become a powerful way of characterizing the modern university and its contribution – in clear contrast to the traditional conception of the university and its social role.<sup>2</sup> In relation to the new role assigned to universities, there is a common and widely-held belief that the higher the amount of spin-off companies a university is able to create, the 'more entrepreneurial' it will be considered. Clark (2004), however, pertinently notes that 'entrepreneurialism in universities should not be seen as synonymous with commercialization'.

The study of the world's most successful entrepreneurial universities has resulted in a considerable body of literature on their characteristics and on the process by which they have transformed themselves (although most published studies are based on n=1 analyses). Examples of studies addressing

The study of the world's most successful entrepreneurial universities has resulted in a considerable body of literature on their characteristics and on the process by which they have transformed themselves (although most published studies are based on n=1 analyses). Examples of studies addressing such

issues include those by O'Shea *et al* (2007), Clark (1998, 2004) and Etzkowitz (1983, 2004). According to these authors, the entrepreneurial university can be understood as a flexible organization which interacts with its social and economic environment, adapting itself to change and seeking out additional sources of funds for research, teaching, technology transfer, commercialization, etc. Clark (1998) states that entrepreneurial universities have in common a strengthened steering core, an expanded developmental periphery, a stimulated academic heartland, a diversified funding base and an integrated entrepreneurial culture, but does not analyse the interdependency between these five characteristics.

The entrepreneurial university, as defined above, must undertake and manage a wide range of activities relating to its three basic roles, as elucidated in the literature on higher education's third mission (Molas-Gallart *et al*, 2002): teaching, research and socio-economic development ('outreach'). These activities, and their management, must be carried out in an entrepreneurial manner: in practice, this demands the involvement of a wide variety of stakeholders. In this context, one of the most significant stakeholders in the new university's third mission is the science park. In our conceptualization of the entrepreneurial university, science parks are closely linked

to the university's<sup>3</sup> 'extended developmental periphery', and from now on we therefore use the term 'entrepreneurial university' to include both the university and the science park.

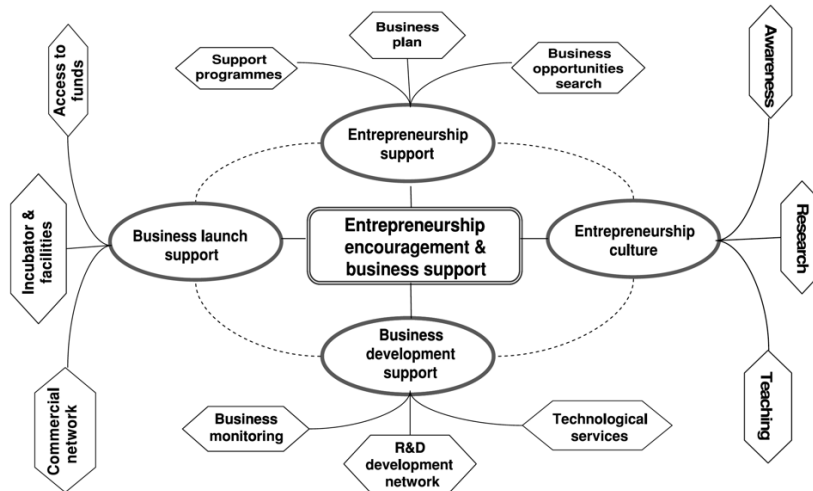
An entrepreneurial culture is defined by Gibb (1999) as the 'sets of values, beliefs and attitudes commonly shared in a society which underpin the notion of an entrepreneurial "way of life" as being desirable and in turn support the pursuit of "effective" entrepreneurial behaviour by individuals or groups'. In accordance with this view, we identify two critical tasks for the entrepreneurial university which are closely related to its third mission. The first of these is entrepreneurship encouragement. Castro *et al* (2001) use the term *dynamisation* to represent the process of building an entrepreneurial culture among stakeholders and the promotion of research and teaching activities in entrepreneurship and related fields. In this respect, *dynamisation* is understood as the induced behavioural change that 'moves someone to do something' (Castro *et al*, 2001). According to these authors, the *dynamisation* process has two critical elements: awareness and motivation activities on the one hand and the provision of facilities on the other.

The second key task is business development support. We define this as the process of opportunity search and recognition, opportunity development, business start-up and business development and growth.

These two key tasks must be developed jointly within an integrative framework, since many stakeholders are involved and the different component activities of each task will benefit from the synergy thus enabled. Hence, a systemic analysis of the EE&BDS process can be used to reinforce all its elements and to devise a framework that will achieve optimal outcomes through the building of stakeholder networks.

A substantial body of literature has been produced on EE&BDS at universities, but most of it tackles the issue in isolation rather than as part of a wider process. For instance, entrepreneurship encouragement is usually considered simply as the promotion of knowledge transfer from universities through the creation of spin-off companies. Similarly, business development support at universities is typically considered specifically in relation to spin-off companies in which the university has intellectual property rights (IPR) or equity. Some authors consider that the business development support process starts with IP protection and ends in IP valorization via shareholder agreements with the spin-off (see, for example, Cuyvers and Zimmermann, 2002). Dalmau *et al* (2003), by contrast, look at the EE&BDS process as a whole, stressing that various activities must be developed and integrated to promote new business from students, graduates and university staff. Their model is based on five phases: awareness, 'opportunity cell building',<sup>4</sup> pre-incubation, incubation and exploitation. It takes into account not only opportunity recognition, development and exploitation, but also the awareness process that precedes opportunity identification. However, this model does not view the EE&BDS process as one in which both external and internal university stakeholders are involved and work together via networks to develop it. Furthermore, the process of building an entrepreneurial culture is referred to merely as developing the awareness of entrepreneurs, again without taking account of the engagement of other stakeholders or the integration of other activities. A different approach is offered by Rasmussen and Borch (2006), who focus on the development of dynamic capabilities in the university: finding new pathways, balancing the past, present and future, reconfiguring resources, and integrating and creating new knowledge. Once again, attention is directed to the creation of research-based spin-off ventures, but these authors recognize that stakeholders within and outside the university are involved in the spin-off creation process and that they have partly conflicting objectives.

An alternative view is offered by Nikos (2004), which considers the development of entrepreneurship-related activities in four main areas: research, teaching, business development support and training and consultancy. This model offers a broader view in that it takes into account other activities as well as spin-off creation and also various stakeholders and networks for the development of those activities. The entrepreneurial process is divided into three phases (van der Veen and Wakkee, 2006): opportunity recognition, opportunity development and opportunity exploitation. Although awareness activities are not included in this process we nevertheless use it as a starting point for our proposed model in conjunction with the entrepreneurial approach of the University of Twente. These two bases, along with the addition of *dynamisation* activities, correspond to what we perceive to be the requirements of an effective EE&BDS process.



**Figure 1.** The EE&BDS model.

### *Towards an integrative approach*

We have shown that the ‘entrepreneurial university’ is now considered the suitable environment for building the EE&BDS process and that there is a need for an integrative approach to embed and develop that process effectively. Our proposed integrative model for EE&BDS is depicted in Figure 1, which shows the four core areas and their related activities. The characteristics and objectives of these core areas and activities are discussed in the next section.

Before embarking on that discussion, however, it is important to stress that a culture of entrepreneurship is of paramount importance if the model is to be applied successfully. We therefore pay particular attention to this area. Many models in the literature do not deal with this issue; rather, they take for granted the existence of the requisite culture.

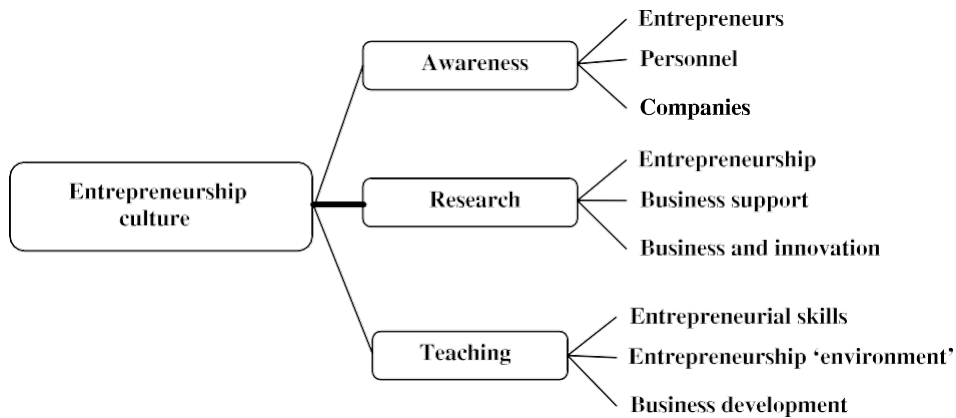
### *Entrepreneurship culture*

Entrepreneurial behaviour among stakeholders and entrepreneurs must be encouraged if the model is to be effective. However, an entrepreneurship culture is not limited to the kind of entrepreneurial behaviour generally associated with an ‘entrepreneurial culture’ (Gibb, 1999). It also integrates entrepreneurship-related research and teaching and associated issues. Figure 2 shows the key activities we consider necessary for the creation of an entrepreneurship culture together with the objectives that apply to each activity.

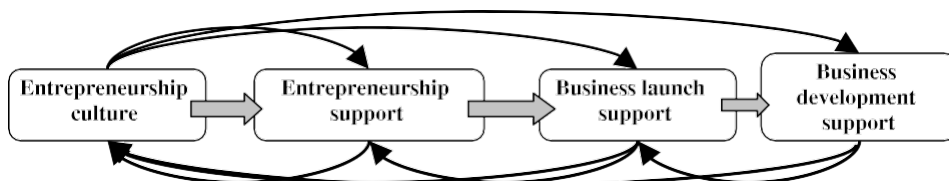
The construction of this culture relies on the promotion of awareness, research and teaching activities. With respect to awareness, the target groups are entrepreneurs and academic and professional personnel in universities and firms. As to entrepreneurs, the goal is to inform them about the process and its possibilities, and to portray new business creation as a self-employment option. The second target group includes researchers, lecturers and any other people involved as stakeholders in the process. The goal of awareness activities directed at this group is to inspire proactive behaviour regarding entrepreneurship support. For instance, researchers should be encouraged to be proactive in helping entrepreneurs to understand technological issues or in advising them about appropriate future R&D. Companies are also a target group for awareness activities: in this case, the goal is to promote the implementation of an entrepreneurial culture in the firm and the development of a proactive attitude towards cooperation with entrepreneurship support organizations. As Grant *et al* (1996) note, it is important to make companies aware of what universities are doing, and thus of the potential for collaboration and the benefits it may bring.

With regard to research activities for entrepreneurship, these will need to cover a wide range of issues – including, for example, skills, entrepreneurial behaviour and the reasons why people decide to create a new business, among many others. Research on business support structures is also important, so that new mechanisms, activities and tools can be designed to support entrepreneurship and business development. Finally, there is a need too to integrate research on business and innovation into the EE&BDS process.

Teaching activities should be carried out at both undergraduate and postgraduate levels. The goal here is not just to train entrepreneurs in business creation (entrepreneurial skills teaching), but also to train people to support and advise entrepreneurs (entrepreneurship environment teaching) and enterprises (business development teaching) within the EE&BDS process.



**Figure 2.** Building an entrepreneurship culture – activities and objectives.



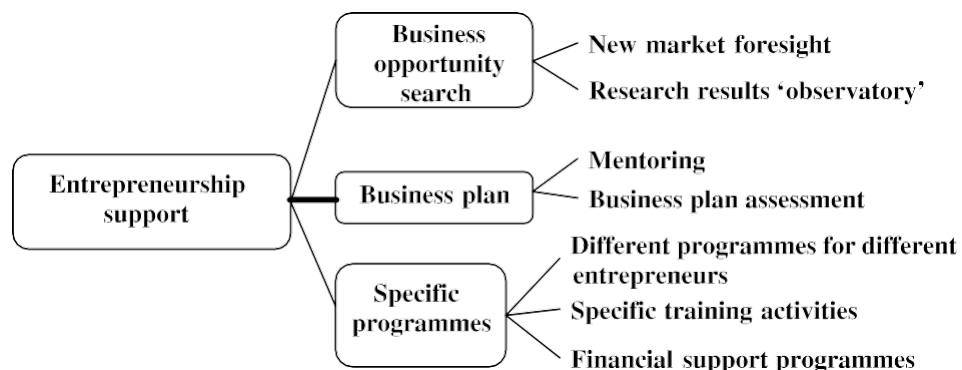
**Figure 3.** The logical foundation of the EE&BDS model.

As can be seen, the activities at this stage are linked to the whole process. They will therefore feed into the other stages and activities and receive feedback from them. In effect, this means that the effectiveness of the model rests on the successful promotion of an entrepreneurship culture. The success of this key stage, however, is a necessary but not a sufficient condition for the overall effectiveness of the whole model. The logic of the model is depicted in Figure 3, from which it can be seen that this first stage influences and is influenced by the rest of the process.

### *Entrepreneurship support*

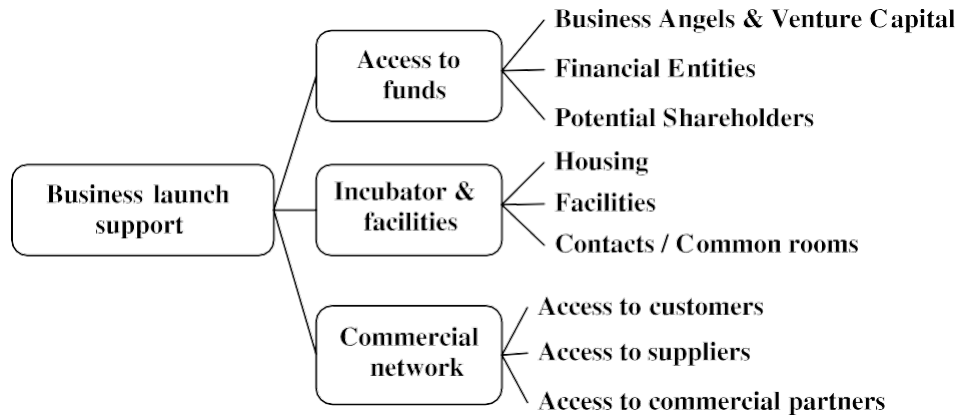
This area integrates those activities that offer entrepreneurs support throughout the process of business plan development, prior to the creation of the new business. This stage must include the business opportunity search, as a knowledge of sector trends will result in better advice to entrepreneurs and the development of a research results ‘observatory’ will help in the timely identification of those results capable of commercialization that would best be exploited by the creation of a spin-off.

Business plan development is a hard and time-consuming activity which potential entrepreneurs must undertake themselves by way of preparation for their future business. The process involves consideration of many of the facets of establishing a new business: strategy, management, accounting, fiscal liabilities and marketing, among others. Many of these issues may well be new territory for the entrepreneur, and so mentoring is crucial at this stage. Once the business plan has been completed, it has to be assessed to determine whether or not the proposed new business is viable. In many cases the answer to this question appears during the business plan development process and it is often the entrepreneurs who realize that the business venture will or will not be feasible.



**Figure 4.** Supporting entrepreneurship – activities and objectives.





**Figure 5.** Business launch – activities and support.

Various support programmes must be offered to help different types of entrepreneurs and business ideas (self-employment, high-tech business, exploiting research results, and so on), since different cases have different needs. Specific training activities (different from and with different goals from those of the teaching activities) for entrepreneurs and business people are needed during this phase. Finally, it must be remembered that the entrepreneur will have to access financial resources at this stage. Funding organizations will usually not provide financial support during business plan development: therefore, if new business creation is to be encouraged, some form of financial support will have to be offered.

All activities and objectives to be covered during this stage are shown in Figure 4.

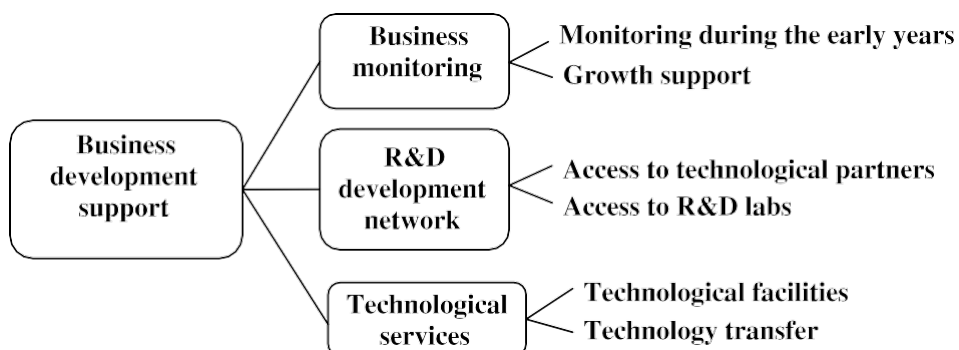
*Business launch support*

This stage includes support activities for the new business during the start-up process, from legal arrangements and funding for the set-up through to the introduction of the product to market and the initial commercialization process. Other activities include supporting the entrepreneurs in their emerging relationships with partners, customers and suppliers. This business launch stage should last at least one year and no more than three. Figure 5 illustrates the various relevant activities.

*Business development support*

The role of the entrepreneurial university is not limited to the creation and start-up processes of new businesses; it should also maintain a productive relationship with the new firms, offering them further support and services during their development and growth. We therefore propose business monitoring as a standard activity during a company's early years, as well as further support to assist with growth if the company requires it.

During this stage the company will probably have to form partnerships for R&D activities. Developing an appropriate network is not an easy task, and the company will need support from the university and other stakeholders. Furthermore, at this stage the company will need technological and advanced services support so that it can grow and develop its R&D activity. According to our proposed model, the activities assigned to this stage (see Figure 6) will help the



**Figure 6.** Business development support – activities.

company and the university to establish strong ties. The model anticipates the participation of entrepreneurs and stakeholders at each stage, helping and contributing to the company's growth. This process of support results in strong ties among firms and the university and related stakeholders that close the cycle and create a cooperative climate, thus enhancing the social contribution of the entrepreneurial university.

### *Summary*

We have illustrated in this section the different activities and goals of the EE&BDS model. However, it must be stressed that the specific tools will need to be developed in accordance with the characteristics of each university and/or science park. Some activities and/or goals may be changed or reoriented. However, the four core areas (entrepreneurship culture, entrepreneurship support, business launch support and business development support) must be kept in place in order to maintain a systemic and integrative approach and thus to achieve the synergistic outcomes that are the ultimate objective of the model. In the short term, some positive outcomes can be obtained simply from a general adherence to the four core activities proposed in our EE&BDS model: however, for the optimal application of the model, those activities need to be strategically developed through a careful consideration of the various goals of each.

A practical example of this proposition is provided by the case of UPV-CPI, which has obtained very good results in terms of new business creation from students, graduates and university staff<sup>5</sup> by carrying out a business creation process that neither integrates all four activities nor takes into account all the stakeholders who might be involved. We argue that, with the application of our EE&BDS model, these good results will improve in the long run, at both quantitative and qualitative levels.



## The case of UPV-CPI

In this section we analyse through a practical example how the EE&BDS model satisfies the entrepreneurs and business needs. The analysis is divided into three parts:

- identifying stakeholders;
- the contribution of each stakeholder;
- locating each stakeholder's contribution in the model.

To illustrate our approach, we present the case of the Polytechnic University of Valencia (UPV) and its linked science park, the Polytechnic City of Innovation (CPI) in the Autonomous Community of Valencia. The regional context affects and is affected by UPV-CPI. In accordance with the above discussion, new stakeholders and new roles for existing stakeholders have come into play at Valencian public universities to take part in entrepreneurship encouragement and business development support.<sup>6</sup> These stakeholders have different and in many cases conflicting goals. A common framework is therefore necessary to unite all the stakeholders in pursuance of a common objective through the establishment of joint strategies. In addition, entrepreneurship-related and business development activities at Valencian universities have traditionally been separated from research and teaching – thus, if the region is to profit from the synergistic outcomes of our model, these activities need to be integrated with each other, again in pursuance of a common goal. Finally, the existing networks between actors and stakeholders inside and outside the university are generally weak.

### *The UPV-CPI environment: identifying stakeholders*

The management of the Polytechnic University of Valencia is the responsibility of its Rector supported by Vice-Rectors, a General Secretary and a General Economic Manager. The UPV management system is structured around several governing bodies: the Social Council, the Government Board, the University Assembly and the Consultancy Board. With regard to its teaching and research activities, UPV has 44 departments and 12 faculties. Research activities are also undertaken at research institutes and centres. The science park, the CPI, is managed by the INNOVA Foundation which is owned jointly by the Valencia Business Confederation and UPV.

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**Table 1. Stakeholders in the UPV-CPI EE&BDS process. Inside UPV-CPI**

UPV-CPI managers (including INNOVA Foundation) Business creation support service (IDEAS Institute) Technology transfer office (CTT)  
Incubator centre and facilities Research institutes and centres Departments  
Faculties  
UPV employment service (SIE)

### **Outside UPV-CPI**

External consultancies Businesses and associations Technology institutes  
Seed capital networks Financial entities  
Government (European, national, regional, local)

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Table 1 shows the stakeholders in the EE&BDS process of UPV-CPI. We differentiate between inside and outside stakeholders to highlight the relevance of the external stakeholders to the entrepreneurial university and its third mission and also the relationships and networks that need to be created and sustained between internal and external stakeholders.

Entrepreneurs and businesses could also be considered as stakeholders, but we do not treat them as such at this stage since they have to be involved in each and every activity in the process as well as to have relationships with all the other stakeholders: it would therefore be redundant to include them here.

Regarding the internal UPV-CPI stakeholders, it should be noted that business creation support at UPV is not carried out by the technology transfer office, but by a separate service (the IDEAS Institute). This service is especially designed to support new business ideas from students, graduates and university staff, and also to create new businesses to exploit the university's IPR.

With regard to research institutes and academic departments, we differentiate between those institutes and departments that focus their activities on socio-economic issues and those with an engineering orientation. The former should become more involved

in the *entrepreneurship culture* stage, especially in research and teaching activities relating to entrepreneurship and business development. The latter have an active role to play in the EE&BDS process, especially in those activities that require technological knowledge. At the same time, departments and institutes (including those with a socio-economic orientation) can eventually become 'customers' in the model, when they want to create spin-offs to exploit their research results.

The university's employment service can also play a part in the EE&BDS process by helping companies to recruit appropriately qualified people. This service is especially significant during the early years of a new business, when the firm may well need qualified people on a part-time basis because it cannot afford full-time specialized employees and/or because there is no need for full-time staff for the particular activities in question. The employment service takes care of the students during and after this period of initial employment and subsequently makes efforts to secure them full-time employment in the firm.

Turning to the external stakeholders, the role of technology institutes should be highlighted. The Valencia Region is endowed with one of the most important technology institute networks in Spain. It brings together 16 technology institutes and 6,700 associated companies offering services to 13,000 customers. The role of these stakeholders is therefore potentially crucial for the EE&BDS process.

#### *Analysing stakeholders' contributions*

Once we have ascertained which stakeholders are involved in the EE&BDS process at UPV-CPI, the next step is to assess what contribution each makes to the process. Such an assessment must take into account the needs of entrepreneurs and firms, as well as the model's own requirements. The stakeholders' contributions should satisfy specific needs in each stage of the process. In the first stage, the stakeholders' objectives are linked to the creation, promotion and consolidation of an *entrepreneurship culture*. Thus the stakeholders are working towards the implementation of the model rather than offering services to entrepreneurs and businesses. This is different from the other stages, in which the stakeholder contribution is linked to the satisfaction of entrepreneurs' and business needs.

According to Kirwan *et al* (2006) the entrepreneurial process takes place in social systems, in which four mechanisms (Groen, 2005) are embedded, related to the specific kinds of capital needed. These are defined as *strategic capital*, *economic capital*, *cultural capital* and *social network capital* (see Table 2). We suggest that entrepreneurs' and business needs during the EE&BDS process can be grouped into these four categories, plus an additional one – *hosting and facilities*, since we consider that incubation and other facilities are crucial if the process is to succeed. The satisfaction of these various needs will considerably facilitate business development and growth in the early years.

In assessing a stakeholder's contribution, we take into account the groups of topics set out previously for each stage of the EE&BDS process. Thus we analyse the contribution of each stakeholder in the context of each category of capital at each stage. Table 3 presents the results of this exercise for the UPV-CPI case. Note that all the capital requirements are covered *only* if the contributions of *all* the stakeholders (both external and internal) are taken into account.

However, if the EE&BDS process is to be implemented at a university, it is also necessary to identify the precise activities through which the various contributions will be made. Again, in making this analysis, we need to bear in mind the characteristics of each stakeholder and their individual goals. The results for UPV-CPI are shown in Table 4, which integrates the various types of capital from Table 2 with the stakeholder contributions shown in Table 3.

As can be seen from Table 4, during the early stages (that is, before the company has begun its operations), university and science park stakeholders make a more substantial contribution to the process. In the two last stages, on the other hand, when the company is in the marketplace, the contribution of external stakeholders' becomes more significant. We also observe that each activity is covered by several stakeholders from inside and outside UPV-CPI (except for incubation and related activities which are undertaken solely by the incubation centre). This again supports our thesis: to achieve optimal outcomes from the model, the approach must be integrative and systemic.

**Table 2. Types of capital, scope and resources.**

Capital needed	Scope	Resources
Strategic capital (SC)	Definition and attainment of strategic goals	Power, authority, influence, strategic intent
Economic capital (EC)	Economic optimization	Money and funds
Cultural capital (CC)	Pattern maintenance and institutionalization of shared symbols	Values, organization, knowledge, skills, experience, technology
Social network capital (NC)	Interactions between actors	Contacts (multiplex, filling structural holes, cohesive, equivalent)
Host and facilities (HF)	Location and physical identity	Place and facilities

Source: Adapted from Groen (2005).

**Table 3. Stakeholders' contribution to the EE&BDS process.**

Stakeholders	Entrepreneurship culture				Entrepreneurship support					Business launch support					Business development support				
	SC	EC	CC	NC	SC	EC	CC	NC	HF	SC	EC	CC	NC	HF	SC	EC	CC	NC	HF
UPV-CPI managers	n	n	n	n		n													
Business creation support	n		n	n	n	n	n	n	n	n		n	n		n		n		
Technology transfer office	n		n	n			n	n				n	n					n	
Incubation centre				n				n	n				n	n				n	n
Research institutes	n		n	n			n	n				n			n		n	n	
Departments	n		n	n			n	n				n						n	
Faculties	n		n				n										n		
Employment services				n								n					n		
External consultancy					n		n	n		n		n	n		n		n	n	
Businesses and associations	n		n	n	n		n	n		n		n	n		n		n	n	
Technology institutes				n	n			n		n			n				n	n	
Venture capital	n		n		n		n			n	n	n	n			n			
Financial entities						n					n					n			
Government	n	n		n		n					n					n			

**Table 4. EE&BDS process activities – cooperation among stakeholders and their contributions to specific activities.**

Stakeholders	Entrepreneurship culture			Entrepreneurship support			Business launch support			Business development support		
	Awareness	Research	Teaching	Opportunity	Business planning	Progress	Funds	Incubation	Commercial networks	Monitoring	R&D	Technology
UPV-CPI managers	SC EC CC NC	SC EC CC	SC EC CC			EC						
Business creation support	SC CC NC	SC	SC CC	SC CC EC NC HF	SC CC EC NC HF	SC CC EC NC HF	SC CC NC		SC CC NC	SC CC		
TT Office	SC CC NC	SC NC	SC CC	CC NC	NC	CC NC	CC NC		CC NC		SC CC NC	SC CC NC
Incubator Center	NC				NC HF	NC HF		HF	NC		NC HF	NC HF
Research Institutes	NC	SC CC NC		CC NC	CC NC	CC NC			CC		SC CC NC	SC CC NC
Departments	NC	SC CC NC	SC CC NC	CC NC	CC NC	CC NC			CC		NC	NC
Faculties			SC CC	CC	CC					CC		
Employment Services	NC								CC	CC	CC	
External Consultancy				SC CC NC	SC CC NC	SC CC NC	SC		SC CC NC	SC CC NC		SC CC NC
Business & Association	SC NC	CC	CC	NC	SC CC NC	NC	NC		SC CC NC	SC CC NC	CC NC	CC NC
Technology Institutes	NC	NC		NC CC	NC	NC			SC NC		SC CC NC	SC CC NC
Venture Capital	SC CC			CC	SC CC		SC CC EC NC		NC		EC	EC
Financial Entities						EC	EC		EC		EC	EC
Governments	SC EC NC	SC EC	SC EC			EC	EC				EC	EC

This analysis helps to identify the kind of networks that are needed among the various stakeholders, indicating the activities for which cooperation is necessary and the contribution required of each stakeholder. In general terms this is a helpful tool in introducing the EE&BDS model at entrepreneurial universities. However, specific tools and activities must be tailored to each case, taking into account its particular characteristics, goals and needs.

#### *Implementing the model: challenges to overcome*

The development of the EE&BDS model in entrepreneurial universities will lead the institutions to influence and to be influenced by their respective environments. In this sense, according to O'Shea *et al* (2007), the success or failure of an entrepreneurial university depends not only on the activities carried out but also on the historical, cultural and economic characteristics of its environment.

With regard to our case study, then, what are the characteristics of the Valencia region? The region has a weak innovation system (Fernández de Lucio *et al*, 2001) with an industrial structure based mainly on traditional SMEs with few graduate employees. There is also a serious lack of structural relationships between public research institutions and industry and, therefore, an absence of effective networks (at both formal and informal levels) between research institutions and the business community (Todt *et al*, 2007; Fernández de Lucio *et al*, 1999). In these circumstances, many firms do not know how they can cooperate with universities and public research institutions and, above all, universities and firms think they have nothing to offer each other.

It is also important to consider the university system and its regulatory framework. The legal framework in Spain is not favourable for the promotion of business activities among researchers. There is also strict regulation concerning the engagement of non-academic professionals in teaching activities at universities and a lack of incentive for them to become involved. In addition, rivalry between stakeholders in developing certain activities discourages cooperation.

The creation and development of an entrepreneurial culture in universities and its further dissemination through awareness activities to stakeholders are essential if these obstacles are to be overcome. These, however, are far from easy tasks and, even more importantly, the implementation process is slow and the proposed model will not render results in the short term: it will be several years before its actual performance and achievements can be assessed. University boards generally look for shorter-term results, and so a strong and long-term commitment from the governing teams must be secured if the model is to be successfully implemented.

## **Summary and conclusions**

To be an entrepreneurial university means much more than supporting new business creation to commercialize research results. The promotion of an entrepreneurial culture and the consequent creative behaviour among stakeholders are crucial aspects of the role of this new type of university. In this context, the EE&BDS process is critical for entrepreneurial universities in that it involves the various stakeholders, activities and tools, bringing them together in a common framework. The process is thus by its nature integrative and systemic.

We have presented an EE&BDS model that envisages a wide-ranging entrepreneurial process based on entrepreneurship culture, entrepreneurship support, new business launch support and business growth support. We have emphasized the establishment of an *entrepreneurship culture* as a crucial stage. In illustration of the approach, we have taken the case of the Polytechnic University of Valencia and its linked science park, the Polytechnic City of Innovation. We have demonstrated how the model can be applied to UPV-CPI – identifying the internal and external stakeholders involved, analysing the contribution of each stakeholder and identifying the activities that comprise each stakeholder's contribution to the EE&BDS process. We have also stressed the need to design specific tools for each activity taking into account the particular characteristics, goals and needs of each university.

The analysis shows that the optimal application of the model is directly related to an integrative and systematic approach: only the actual involvement of all stakeholders and the creation of networks among them will fully satisfy the needs of entrepreneurs and business organizations and the requirements of the model itself. Further research on the model will provide data for an in-depth analysis of the design and development of specific tools for each stage and of the required levels of the various networks.

Finally, and with regard to the specific implementation of the model at Valencian universities, we have shown how several challenges (the weak Valencian innovation system, the lack of cooperation between stakeholders and a strict and unfavourable regulatory environment) can affect the implementation process. We conclude that the promotion of an entrepreneurial culture and the development of entrepreneurial behaviour among stakeholders, supported by the long-term commitment of university managers, are crucial for the optimal implementation of the model.

## Notes

<sup>1</sup> Nikos, located at the University of Twente in the Netherlands, is the Dutch Institute for Knowledge Intensive Entrepreneurship. <sup>2</sup> Grit (2000) also recognizes the 'critical university' as another reaction of universities to society.

<sup>3</sup> Science parks may be part of the university, or an autonomous unit. However, in all cases we find strong ties between park and university: typically, university personnel will be on the steering committee of the science park and *vice versa*.

<sup>4</sup> These authors define the 'Opportunity Business Cell' as the integration of the three elements required to build a new business: the business idea, an entrepreneurial team and the necessary resources. They argue that these elements are the initial 'Cell' of a new business.

<sup>5</sup> UPV has supported the creation of more than 300 new businesses since 1992 through the IDEAS Institute.

<sup>6</sup> Five science parks linked to their respective public universities are now being built in the Autonomous Community of Valencia. They will host, among other things, research institutes, technology-based firms and incubation centres, and will offer facilities and services mainly related to the EE&BDS process.

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