

Entrepreneurship Policy for Entrepreneurs:  
A Cognitive Approach to the Entrepreneurial Environment  
by  
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## **Abstract**

Entrepreneurship stimulates economic growth, creates jobs, and provides opportunities for independence and self-realization. Over the last 10 years, policy makers around the globe have been actively pursuing the elusive goal of an entrepreneurial economy. Often building on existing Small and Medium-Sized Enterprise (SME) policy, efforts have been taken to encourage entrepreneurship by, for example, reducing red-tape and improving access to financing. However, these efforts do not appear to be having the hoped effect of fostering more entrepreneurship.

Starting from the maturing field of literature that applies cognitive science to entrepreneurship, this thesis examines what motivates entrepreneurs to start new ventures. I then use this understanding to develop policy options that aim to directly target individuals and foster more entrepreneurship as a unique interdisciplinary contribution to the literature on entrepreneurship policy.

This thesis develops a framework for a cognitive approach to policy, which aims to put the entrepreneur at the heart of entrepreneurship policy. The cognitive approach is a tool for policy-makers to enable them to more readily understand entrepreneurs' mindsets and the policy options that can foster entrepreneurial intentions in their constituencies.

In applying the cognitive approach to the entrepreneurial environment, this thesis shows that the types of policies necessary for fostering entrepreneurship are different from those currently favored by policy makers. Unlike SME policies, fostering entrepreneurship requires policies that help individuals build self-efficacy and entrepreneurial intentions through personal experiences, networks, feedback and mentorship.

In the final chapters, the cognitive framework is applied to the MIT-Portugal Program, demonstrating how to apply this framework pragmatically and highlighting considerations for exporting entrepreneurship curricula from MIT to Portugal.

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## 1. EXECUTIVE SUMMARY

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This thesis aims to refocus policy-makers' thinking on how to foster entrepreneurship by viewing it from the perspective of the entrepreneur.

My contribution to the literature is a new framework that assists policy-makers in identifying the policies that best foster entrepreneurial activity.

Entrepreneurship policy typically encompasses policies such as: increasing spending on research and development to foster innovation; altering competition policy to enhance the role of small companies; reducing the legislative hurdles for establishing a business; and increasing the availability of financing for entrepreneurial ventures. These policies are often extensions of Small and Medium-sized Enterprise policy (Lundström & Stevenson, 2005).

Recent evidence from the Global Entrepreneurship Monitor (GEM) indicates that these policies may not be having an appreciable effect on entrepreneurship. Only three out of 22 wealthy countries surveyed by GEM have increased their rate of entrepreneurial activity in the past five years (Bosma, Jones, Autio, & Levie, 2007).

To shed new light on this complex problem, I have approached entrepreneurship policy and the entrepreneurial environment from the entrepreneur's perspective. A maturing literature applies cognitive science to entrepreneurship by studying entrepreneur's unique cognitions and the thought processes that drive entrepreneurial action. This body of work has brought new understandings of the fundamental drivers of entrepreneurial intentions, and I use these recent findings to form a framework for examining policy options.

This work shows that to foster entrepreneurship, policy-makers must work with individuals by focusing on four fundamental and distinct areas that have been shown to drive entrepreneurial action:

- The ability to put together the pieces of the puzzle necessary to start a new venture and

to assess and create new venture opportunities

- The belief in one's skills that is known as entrepreneurial self-efficacy;
- Entrepreneurial intensity or the willingness to act; and
- The perceived desirability of becoming an entrepreneur;

The crucial aspect of all these factors is perception—the subjective evaluation of entrepreneurship, rather than the objective evaluation. Stimulating entrepreneurship requires changing people's perceptions. The objective value of the support environment—measured in tax breaks, government funding, and the paperwork required to start a company—is important, but does not capture individuals' primary drives, which are the topic of this thesis.

I use these four drivers—abilities, belief, commitment, and desire—as a framework for examining entrepreneurship policy. This framework is the cognitive approach to the entrepreneurship environment. On examining the environment from this perspective, I find a set of policies that can be used to foster entrepreneurial intentions. These recommended policies are distinctly different from those that policy-makers internationally use most often to stimulate entrepreneurship.

To demonstrate how the cognitive approach can be applied practically to generate policy recommendations, I use the case of the MIT-Portugal program. One of their key constituencies is students in advanced scientific degree programs in universities across Portugal. As a group, these students have a fairly high perception of the desirability of entrepreneurship, but low entrepreneurial self-efficacy and low access to networks required to start ventures. For these students, I identify policies that could help to build entrepreneurial cognitions while fitting into the existing entrepreneurial infrastructure, including: case-based teaching, individualized feedback, and more heterogeneous networking that reaches beyond their usual network of scientists and researchers.

In order to put these policies into action, policy-makers must then identify individuals who can influence the entrepreneurial cognitions of our target group. These influencers are known as

policy actors. Actors need to be within the reach of the policy-makers, in this case the MIT-Portugal Program. For the MIT-Portugal Program, potential actors of policy to influence the students are: fellow students in other disciplines, young Portuguese entrepreneurs, and MIT faculty, to name a few.

It is important to note that such an analysis should be performed separately for each constituent group. For example, students may lack some of the same cognitive elements as faculty within the MIT-Portugal Program, which I also examine in this thesis. But the policy actions and actors required to address the gaps may be different for different groups. Where students can learn through case-based teaching, faculty may be best taught through mentorship; and where students could benefit most from exposure to young entrepreneurial role models, faculty may need idea spotters to help them see the commercial potential of their research.

At the core of this thesis is a message for policy-makers that entrepreneurship comes from the heart, not the head. To foster more entrepreneurship, policy-makers must create people who believe in themselves, and have the tools and people around them so that they can pursue their dreams confidently and effectively. Only a small part of that vision is about providing traditional resources; the rest is about working with individuals. Most policy makers operate in resource-limited environments where they can do only a small number of things, so they must focus their attention locally, with a targeted approach, to stimulate people's entrepreneurial spirit. From this starting point more traditional policies—such as business support services—can then be brought to bear, building on a virtuous cycle of new ideas, new networks, and success stories.



*“To start with, let me tell you the basic assumption behind this project... that market characteristics, macroeconomic conditions, regional geographic attributes, national R&D intensity, the presence of opportunities, the availability of money, positive entrepreneurial climates, social networks, and speeches by politicians do not start businesses. Businesses are started when somebody wakes up in the morning and says ‘maybe I’ll start a business today’.”*

*-- Paul Reynolds, Global Entrepreneurship Monitor Project Coordinator*

### 2.1 Motivation

As an aspiring entrepreneur, the above quote from Paul Reynolds echoes my beliefs on entrepreneurship policy strongly. But the question that this leaves me with and what has motivated this thesis is: What motivated that somebody to decide to start their business? And if we know that, what policies can we use to foster more entrepreneurship?

Entrepreneurship stimulates economic growth, creates jobs and provides opportunities for independence and self-realization. This thesis is a small contribution to the growing literature that aims to help policy makers look at the entrepreneurial environment from the perspective of the individual, and to recommend policies that can directly target and foster entrepreneurial intentions and actions.

### 2.2 Entrepreneurship as a force for economic growth and job creation

Entrepreneurship and small businesses are a major source of new jobs. In 1987, David Birch of MIT published his book *Job Creation in America: How our smallest companies put the most people to work*, which demonstrated that small companies were responsible for the majority of new jobs in the US economy. Although later surrounded in controversy over his methods (Acs & Mueller, 2008), he was not the only scholar to reach that conclusion. Peter Drucker’s seminal

1985 work *Innovation and Entrepreneurship* also highlighted that between the mid 1960s and the mid 1980s, small and medium-sized companies were responsible for 40 million new jobs, while by 1984 Fortune 500 companies had lost around 5 million jobs.

More recently, Acs and Mueller (2007), showed the positive impact of new small and medium sized enterprises on job creation. In particular, they showed that high-growth new companies with between 20 and 500 employees had a long-lasting impact on job creation in a local economy. These same findings – new firms being responsible for job creation – have also been confirmed for countries outside of the United States (Wong, Ho, & Autio, 2005).

Entrepreneurship has also been cited as a contributor to economic growth. In 2005, van Stel, Carree, and Thurik showed that for countries with a per capita GDP greater than US\$20,000, there was improvement in economic growth where increased entrepreneurial activity was seen.

Aside from job creation and economic growth, there are many other reasons that explicit entrepreneurship policy is worth of attention by policy makers: it is “at the heart of national [competitive] advantage” (Porter, 1990); it is an important vehicle for technology transfer and the commercialization of new innovations (Carlsson, Acs, Audretsch, & Braunerhjelm, 2007 and others); and it provides an opportunity for independence, financial success, self-realization, and recognition (Carter, Gartner, Shaver, & Gatewood, 2003 and others).

The growing prominence of entrepreneurship policy shows that policy makers acknowledge these facts. However, as we will see, it is not yet clear to policy makers, or scholars, what policy options are the most effective in fostering entrepreneurship. The approach tends to be to recommend a little bit of everything (Lundström & Stevenson, 2005), and the emphasis of implementation seems to be on what is easiest for governments to enact.



## **2.3 High-tech entrepreneurship**

The subset of entrepreneurial ventures that is involved with advanced technologies is often thought of as a vital to building economic growth through entrepreneurship. In 1997, MIT published a report showing that “if the companies founded by MIT graduates and faculty formed an independent nation, the revenues produced by the companies would make that nation the 24th largest economy in the world” (Bank of Boston, 1997). That bold claim comes from the fact that the “4,000 MIT-related companies employ 1.1 million people and have annual world sales of \$232 billion” (Bank of Boston, 1997). With more than 90% of those companies being technology-related, this report sparked much interest around the world and highlighted the power of technology-based entrepreneurship.

One indication of this interest is that investment in R&D has grown substantially over the last ten years and continues to be high, with expenditures in the OECD totaling \$771 billion in 2007 (2.25% of GDP) and \$115 billion in China alone in 2005 (OECD, 2007).

Technology entrepreneurship does provide an excellent venue for high-growth entrepreneurship, since bringing brand-new products to the market can revolutionize industries or even create whole new industries.

However, more recent research, such as Wong et al. (2005), has shown that the key contributor to economic growth is in fact the high-growth aspect of these businesses rather than the high-technology. So the benefits of entrepreneurship need not be restricted to countries or local regions with advanced science and technology.

## **2.4 Goal**

The goal of this thesis is to motivate a re-assessment of entrepreneurship policy from the perspective of the entrepreneur. My starting point for examining entrepreneurship policy is the cognitive science of entrepreneurial intentions, which examines the core cognitive drivers

of entrepreneurial action. From that point, I offer suggestions for policy makers to re-focus their entrepreneurship policy efforts in ways that are more targeted and more direct.

This thesis does not provide universal prescriptions for entrepreneurship policy; it aims to develop a new approach for policy makers to enable them to look at entrepreneurship policy through a new lens.

My contribution to the literature is an examination of entrepreneurship policy from the perspective of a potential entrepreneur using cognitive science as a tool. A potential entrepreneur is an individual who may not currently have any entrepreneurial aspirations. The hope is that this work will enable policy makers – be they governments, universities, or private groups interested in entrepreneurship – to have a clearer understanding of what motivates entrepreneurship in the first place. And with that knowledge be able to make more informed decisions about how to foster entrepreneurship.

## **2.5 Thesis Outline**

### **2.5.1 Background literature**

The first third of this thesis develops this new approach to entrepreneurship policy. Beginning in Chapter 3 with an overview of the current entrepreneurship policy, I look at actual implemented policies from around the world to understand the tools that policy makers are currently using to try and stimulate entrepreneurial activity. Chapter 3 finishes with some of the highlights of recent research that shed new light on the common wisdom of policy approaches.

Having provided the background and the impetus for a new approach to entrepreneurship policy, I go back to basics: to the entrepreneur. Having looked at the environment in which she operates, Chapter 4 examines the cognitive theories of entrepreneurship. Specifically, I look at the now-maturing theories of the cognitive factors that affect the decision to become an entrepreneur. At the end of Chapter 4, I bring together two particular theories, the “intentions-

based” model and the “cognitions” model. Although they have been developed independently and are built on very different underlying cognitive science, I find they are extremely compatible. In fact, their compatibility in spite of their different backgrounds highlights their respective strengths, and bringing them together into one framework provides a much more complete framework from which to approach policy formulation.

### **2.5.2 Theory development**

Chapter 5 is the heart of this thesis. Having looked at the theory behind the entrepreneurial decision I outline a set of policy options which can directly affect potential entrepreneurs. Chapter 6 then provides a methodology for policy-makers to select amongst those policy options and to develop policy recommendations. These two chapters form my cognitive approach to entrepreneurship policy. And in Chapter 7, I briefly discuss the implications of this cognitive approach.

### **2.5.3 Applying my framework – Education and the MIT-Portugal program**

Chapter 8 applies the cognitive approach to the case of the MIT-Portugal Program to make recommendations as to how to foster more entrepreneurship amongst their students and faculty. This Chapter demonstrates that the cognitive approach is relatively straight forward and can be applied practically to elicit policy recommendations. Finally, in Chapter 9 I look at the special case of entrepreneurship education, with the particular focus on the transfer of the MIT class i-Teams to Portugal within the MIT-Portugal program.

## **2.6 Definitions**

### **2.6.1 Who is an entrepreneur?**

In this thesis, I am primarily concerned with fostering entrepreneurship in groups who are not

currently entrepreneurs. I refer to these individual as potential entrepreneurs. Moreover, I am concerned not only with fostering more entrepreneurship but also with high-quality entrepreneurship that brings new ideas and opportunities to the marketplace.

For the purposes of my work, I use Peter Drucker's definition from *Innovation and Entrepreneurship* (1985). He proposes a broad definition: "To be entrepreneurial, an enterprise has to have special characteristics over and above being new and small. Indeed entrepreneurs are a minority among new businesses. They create something new, something different; they change or transmute values." Drucker illustrates this definition to provide more clarity. For example, "the husband and wife who open another... restaurant...surely take a risk. [But] all they do is what has been done many times before. They...create neither a new satisfaction nor a new customer demand...McDonald's, however, was entrepreneurship. It did not invent anything, to be sure. Its final product was what any decent American restaurant had produced years ago. But...McDonald's both drastically upgraded the yield from resources, and created a new market and a new customer. This is entrepreneurship."

For scholars in particular, the definition of what constitutes entrepreneurship has still not been settled. This, as Shane and Venkataraman (2000) point out, has provided significant challenges for the discipline of entrepreneurship research coming together. While I could spend an entire chapter, thesis, or even PhD examining this topic alone it is relatively unimportant for this work as my approach could be adapted and applied depending on whatever particular focus a policy-maker chose to take. This is not to belittle the importance of this question, but many others have examined it in detail (see Lundström and Stevenson, 2005; Casson, 2006).

### **2.6.2 Who is a policy-maker?**

Again, for policy-makers, I take a broad definition. I consider a policy maker to be any individual or institution, private or public, who operates within the entrepreneurial ecosystem and is charged with fostering entrepreneurship within their given sphere of influence. Whilst this definition could extend to managers in corporations interested in stimulating their own private

activities, and indeed the proposed approach could be applied in this setting, the focus of this thesis is policy makers who are operating for some wider societal benefit. In this context, that can often mean that they do not have direct control over all of the parts of the system which they need to influence. The thesis focuses on governmental (local, regional and national) policy makers, as well as universities, private groups of individuals and industry associations, and touches on a variety of the other stakeholders who are part of the entrepreneurial ecosystem and can become policy actors. Lundström and Stevenson (2005) provide a comprehensive list of the stakeholders that are part of the entrepreneurial ecosystem, and this list, shown in Figure 1, is a good overview of all the possible entities that I could consider policymakers or policy actors.

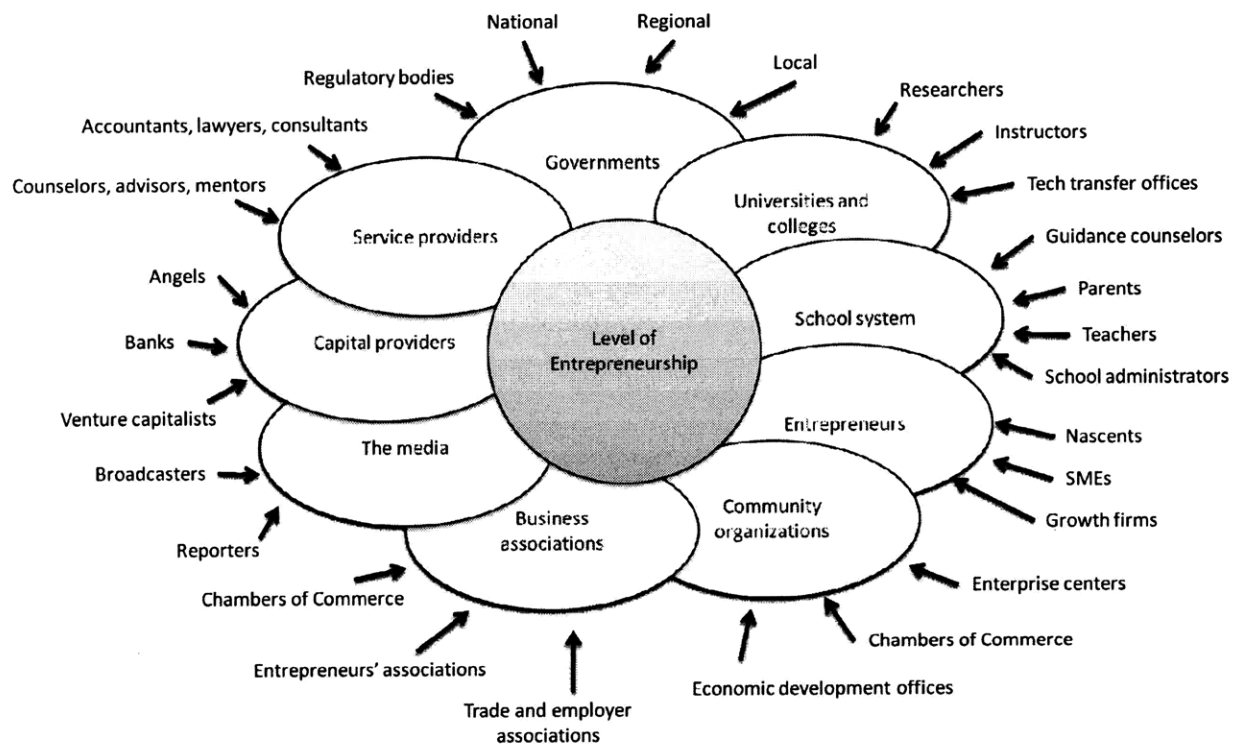


Figure 1: Actors, and potential policy makers, in the entrepreneurial ecosystem (Lundström & Stevenson, 2005)

### 2.6.3 What is a cognitive approach?

My term a “cognitive approach” derives from the fact that my approach uses the literature on the cognitive science on entrepreneurship. Cognitive science is the interdisciplinary study of the

mind and intelligence. Over the last 15 years there has been increasing interest in understanding entrepreneurship through the lens of cognitive science (Wadeson, 2006). As the field has begun to mature it has provided new tools for understanding some of the unique characteristics of entrepreneurs and, most importantly, the drivers of entrepreneurial behavior.

As Carter et al. (2003) point out, “New businesses are not created by accident. The effort and time involved in starting a business would suggest that entrepreneurial actions are clearly intentional.” The “cognitive approach” taken in this thesis does not derive from a technical definition. It is simply a new approach to policy with cognitive science providing the tools, as opposed to macroeconomics, systems dynamics, real options or the host of other tools that can – and have – been applied to entrepreneurship.

## **2.7 Research Conducted**

Much of the work presented in this thesis is from secondary sources. However, over the course of my research, I conducted two sets of primary research. The first was in Karachi and Lahore in Pakistan during summer 2007, and the second was in the north of Portugal in April 2008. I interviewed a variety of entrepreneurs, organizations engaged in fostering entrepreneurship, students, faculty members, and other members of the entrepreneurial ecosystems in these countries. A complete list of interviews is provided in Appendix A.

This work helped me to understand: the motivations of entrepreneurs; how entrepreneurial ecosystems can vary across different geographies, industries and cultures; and most importantly, it helped me keep my work and theory development pragmatic and relevant.

In Chapter 8 I use my work in Portugal to provide an example of how to apply the cognitive approach to develop policy. However, much of the work I conducted is not presented in this thesis as it was used mostly to help me understand how best to develop the approach that is the core output of this thesis.

### 3. CURRENT ENTREPRENEURSHIP POLICY

---

*“Our lacunae in the field of entrepreneurship need to be taken seriously because there is mounting evidence that the key to economic growth and productivity improvements lies in the entrepreneurial capacity of an economy.”*

*-- Romano Prodi, Speaking as President of the European Commission, 2002*

Current entrepreneurship policy tends to focus on improving access to risk capital, reducing regulatory burden and providing business support. New evidence shows that these traditional approaches might not be the right ones. This chapter discusses why we need entrepreneurship policy, describes the policies that are currently being put into practice, and highlights some key concerns about these approaches to policy.

#### 3.1 Why we need entrepreneurship policy

Policy is used to correct market failures which occur for a number of well documented reasons including externalities, asymmetric information, and unfair competition. For the case of small and medium-sized enterprises (SMEs), Storey (2003) highlights that the main market failures that need to be addressed through public policy are that:

- individuals do not realize the private benefits of starting a business;
- small business owners do not realize the value of obtaining expert advice from outside;
- financial institutions cannot accurately assess the viability of an SME and hence underserve this market segment; and that
- social returns exceed private returns as there are positive externalities and spillover effects to starting a business – even if that business fails.

## 3.2 Policy Options

Audretsch, Thurik, Verheul, & Wennekers (2002) identified five broad categories of policy that governments can use to influence levels of entrepreneurship. In their assessment, governments can:

1. Affect the number and type of entrepreneurial opportunities available by:
  - a. Subsidizing R&D to generate more technology-based opportunities;
  - b. Using income or fiscal policies to stimulate higher wealth or income disparity that could increase the demand for niche products;
  - c. Improving the accessibility of markets through competition policy; and
  - d. Reducing legislation for company formation can improve attractiveness of opportunities.
2. Affect the number and types of entrepreneurs by using immigration, fiscal and regional development policies to attract new workers, skills and demographics.
3. Influence the availability of resources, skills and knowledge of individuals by:
  - a. Enhancing venture capital markets;
  - b. Providing direct financial support to companies; and
  - c. Providing business information.
4. Influence preferences of individuals by:
  - a. Introducing entrepreneurial elements into the educational system; and
  - b. Paying attention to entrepreneurship in the media.
5. Affect the decision making process of individuals by using generic macro-economic policies such as: taxation; social security; labor market regulation; and bankruptcy policy

A more detailed version of their policy options is presented in Appendix B.



### 3.3 Policy Implementation

Governments around the world have embraced entrepreneurship policy as a tool to strengthen their economies (eg. UN, 2004; OECD, 2008; [http://ec.europa.eu/enterprise/enterprise\\_policy](http://ec.europa.eu/enterprise/enterprise_policy)). The currently implemented entrepreneurship policies are focused on improving access to capital, reducing regulatory burden, and providing business support. These focus areas are more in line with the needs of SMEs than with those of individuals.

Entrepreneurship policy should be distinct from SME policy as it needs to be aimed at individuals including those not yet pursuing ventures rather than existing and legally identifiable entities (Lundström & Stevenson, 2005). However, entrepreneurship policy has, by-and-large, been tacked-on to existing SME policy rather than being considered as a separate class (Lundström & Stevenson, 2005). As this thesis will show, policies that target individuals are distinctly different from those that target SMEs.

Lundström and Stevenson (2005) found that, across thirteen countries<sup>1</sup> with a wide variety of levels of entrepreneurship, implemented policy gathered around the following six themes:

1. Entrepreneurship promotion
  - Increasing awareness of entrepreneurship; foster an entrepreneurial culture
2. Entrepreneurship education
  - Increasing emphasis on entrepreneurship in the education system
3. The environment for start-ups
  - Easing entry, early-stage survival and growth, and exit by reducing administrative and regulatory burdens
4. Start-up and seed capital financing

---

<sup>1</sup> Australia, Canada, Denmark, Finland, Iceland, Ireland, the Netherlands, Norway, Spain, Sweden, Taiwan, the United Kingdom, and the United States.

- Increasing the supply of financing to new entrepreneurs and early-stage firms
5. Business support measures for start-ups
- Increasing the amount and quality of business support to nascent and new entrepreneurs
6. Target group strategies
- Increasing the start-up rates of under-represented groups in the society or to increase the number of innovative entrepreneurs

From their six themes, Lundström and Stevenson (2005) then scored governments on the extent to which their entrepreneurship policy stated it was pursuing each of these themes. They then compared these stated objectives with the actual comprehensiveness of policies. Policy comprehensiveness is defined as the extent to which stated policies were being funded and implemented,<sup>2</sup> as opposed to being simply listed as goals. Both the extent of the goal and its comprehensiveness were given a percentage-based score. The averaged percentages for the thirteen countries are shown in Table 1, along with a metric I derived to enable comparison of the total coverage a given policy area is receiving.

It is worth emphasizing that Lundström and Stevenson (2005) did not judge comprehensiveness based on their personal view of best practice in entrepreneurship policy. Governments were assessed in relation to their own stated aims.

Table 1 shows that, across the thirteen countries studied, increasing access to financing is the best covered policy, whereas entrepreneurship education is the least well executed across the 13 countries studied. The promotion of entrepreneurship policy and policy for target groups are also poorly implemented with 53.3% or less coverage.

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<sup>2</sup> Lundström and Stevenson defined the level of implementation that constituted effective.

<b>Entrepreneurship Policy Framework Objectives</b>	<b>A % with stated objectives</b>	<b>B Comprehensiveness rating</b>	<b>A x B - Implied % of policy actually enacted</b>
Promotion of entrepreneurship	85%	56.3%	47.9%
Entrepreneurship in the education system	77%	54.5%	42.0%
Easing entry, early-stage survival/growth and exit	92%	72.0%	66.2%
Access to start-up, seed, and early-stage financing	100%	83.6%	83.6%
Business support for start-up and early-stage growth	92%	70.4%	64.8%
Policy for target groups	85%	62.7%	53.3%

**Table 1: Stated and actual entrepreneurship policy across 13 countries (adapted from Lundström and Stevenson 2005)**

Looking deeper into each theme, Lundström and Stevenson (2005) also provide additional lessons on where governments are struggling to implement policy. For example, within the comprehensiveness rating, one of the items on which governments were assessed was whether a portion of the government’s budget was allocated for a given theme. For the theme “promotion of entrepreneurship” only 5 out of 13 countries (38%) were allocating budget allocated for this task. From this we might infer that, although most countries (85%) cite this theme as an aim, they either don’t know how to achieve this, or do not regard it as sufficiently important to allocate funding to it.

Other areas of concern raised by their analysis are that: K-12 education is receiving significantly less support than higher education; performance standards for business support centers are in place in only 23% of countries; and that the professional development of business advisors –

people who work in business support centers providing advice to companies - is not being addressed.

### **3.4 Impact of entrepreneurship policy**

Recent studies are showing that conventional policy options may not be having the impact hoped for or be the most appropriate approaches. Out of twenty-two wealthy countries studied by GEM (2007), entrepreneurial activity has increased in only three of these countries over the past five years despite the active pursuit of entrepreneurship policy by most of these nations

Evidence on the impact of specific entrepreneurship policies has been somewhat scant due to a chronic lack of evaluation by governments (Storey, 2003). However, as the Global Entrepreneurship Monitor – a cross-country dataset on entrepreneurial activity – has started to mature new evidence has become available.

#### **3.4.1 Evidence of the effect of regulation in entrepreneurial activity**

Van Stel, Storey, and Thurik (2007) paper brings together GEM data on entrepreneurial activity with data on the regulation of business entry provided by the World Bank's annual Doing Business survey. They showed that, contrary to conventional wisdom, the "administrative considerations of starting a business - such as the time, the cost, or the number of procedures required – are unrelated to the formation rate of either nascent or young businesses." Figure 2 graphically represents their findings for the 39 countries studied.

Van Stel et al. (2007) make an important point that "the current paper has re-opened an important debate on a key policy area. If administrative entry barriers play only a very modest role in explaining variations in enterprise creation rates, then the current 'fashion' for countries to compete by lowering these barriers needs to be reviewed."

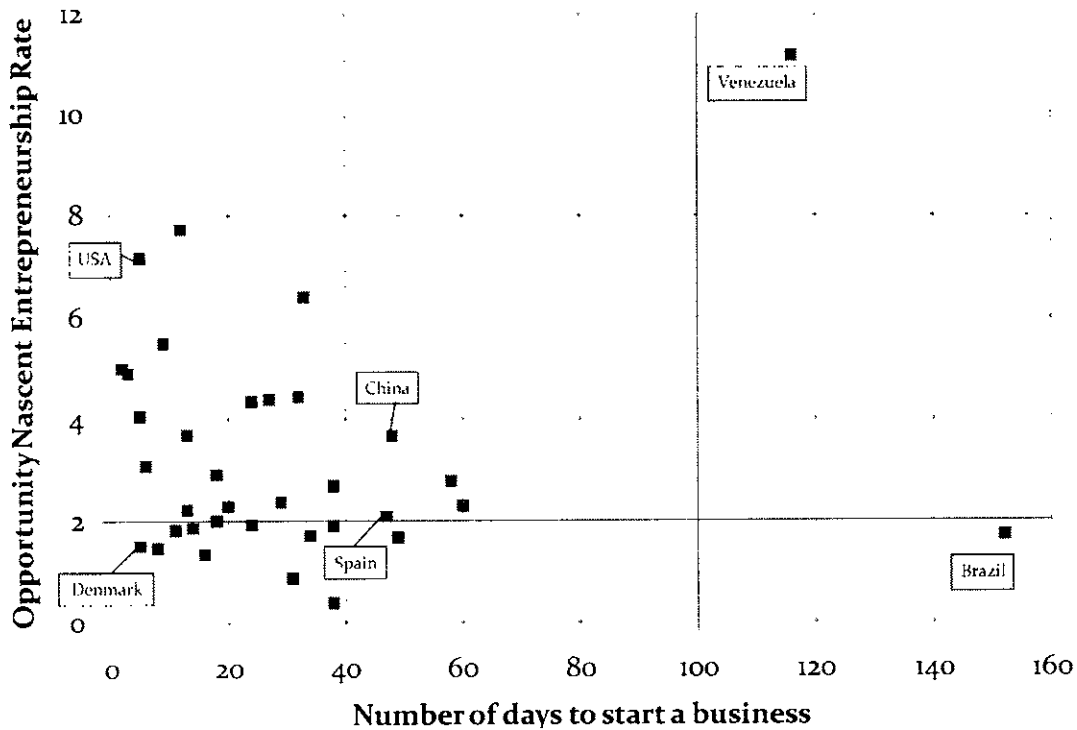


Figure 2: Number of days to start a business vs. level of entrepreneurship (data from van Stel et al., 2007)

However, they did find that, in keeping with traditional economic thinking, if labor market regulations are more rigid, there is a negative impact on entrepreneurship. That is, “in countries where the flexibility of employers to hire and fire employees is higher, the various rates of entrepreneurship also tend to be higher.” They provide two possible explanations for this phenomenon: job insecurity could encourage individuals to go into entrepreneurship as a way to realize more stability for themselves (“a push effect”), or potential entrepreneurs could find that the ability to hire and fire workers more easily makes starting a business a more attractive opportunity (“a pull effect”). The next chapter highlights the strong cognitive evidence for the “push effect” and the role of dissatisfaction in creating entrepreneurial decisions.

### 3.4.2 Evidence on venture capital in entrepreneurial activity

Within the field of entrepreneurial capital, much media and scholarly attention has been devoted to venture capitalists and their ability to identify and cultivate success stories such as Google, eBay, and Cisco Systems (see Gompers & Lerner, 2003 for an overview). However, GEM

has highlighted the need for policymakers to step back before pursuing aggressive policies to promote risk or venture capital, such as those that have been seen in the EU recently (European Commission, 2004).

Reviewing GEM data in 2003, Bygrave showed that informal investment was a key driver of entrepreneurial activity. Informal investment is the personal investment by individuals in a company not founded by them. In 2001, the total amount of capital invested in entrepreneurial activities in a set of 24 countries<sup>3</sup> was almost \$300 billion, of this 81.5% was informal investment. Moreover, of the \$59 billion that was invested by venture capitalists, \$40.6 billion was from within the United States, making the average percentage of financing of entrepreneurial ventures taken up by venture capital outside the United States only 13.7%.<sup>4</sup> Even in the United States, the majority (71.9%) of financing comes from informal investment.

This is not to dismiss Venture Capital, as it has been shown to be strongly linked with high-growth entrepreneurial performance in the US (Bygrave, Hay, Lopez-Garcia, & Reynolds, 2001). It is just important to note that stimulating venture capital is tricky and it is also generally highly concentrated on certain types of investment (Gompers & Lerner, 2003). Whereas informal investment has also been linked to strong entrepreneurial activity and is an existing pool of financing that is more readily available across countries. So policy makers may wish to consider harnessing this un-tapped resource rather than pursuing expensive, new venture capital funds.

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<sup>3</sup> Australia, Belgium, Canada, Chile, China, Denmark, Finland, Germany, Hong Kong, Hungary, Iceland, Ireland, Israel, Netherlands, New Zealand, Norway, Singapore, S. Africa, S. Korea, Spain, Sweden Switzerland, U.K. and USA

<sup>4</sup> This figure excludes Israel who is unique, even by US standards, at having 75% of entrepreneurial financing coming from venture capital.

## 4. COGNITIVE ASPECTS OF ENTREPRENEURSHIP

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*“Research into entrepreneurial cognition offers a way to bring the entrepreneur back into entrepreneurship.”*

*-- Norris Krueger, Clinical Professor of Entrepreneurship, Boise State University*

Entrepreneurship begins when an individual decides to undertake a new venture. In order to foster more entrepreneurship, it is therefore necessary to understand how people make that decision. The cognitive literature presented in this Chapter provides this understanding and forms the basis for my cognitive approach to entrepreneurship policy.

### **4.1 An entrepreneur’s different perception of risk**

Traditionally entrepreneurs are regarded as risk-seeking or risk-tolerant individuals. The logic is that, since many new companies fail, entrepreneurship is a risky business, so individuals who become entrepreneurs must be more risk tolerant than the rest of the population. However, counter to this popular opinion, cognitive science has shown that entrepreneurs are not more risk-seeking than the rest of the adult population.

Tversky and Kahneman (1981), in their ground-breaking work on Prospect Theory, empirically determined that people will predictably shift their preferences to an economically “irrational” outcome, or state, if outcomes are framed relative to different reference points.

Building on this, Palich and Bagby (1995) showed that, while entrepreneurs do not view themselves as more risk-seeking than non-entrepreneurs, they do *frame* situations differently. This leads to entrepreneurs seeing more opportunities and assessing those opportunities more positively than non-entrepreneurs do. So the decision to pursue an opportunity is not more risk-seeking because the entrepreneur has framed the situation such that it is viewed as a reasonable, correct decision. They also showed that non-entrepreneurs displayed the opposite

tendency and framed the situations with more threats and weaknesses, leading to pessimism.

The implication for policy is that there is not some set number of opportunities present in a region or economy. People can find more opportunities if they look at situations in a new manner, with a different frame.

## **4.2 Entrepreneurial perceptions**

Building on the fact that perceptions, as opposed to objective evaluations, are crucial in entrepreneurship, new evidence shows that positive perceptions tend to override the negative perception of a fear of failure.

Arenius and Minniti (2005) showed that, in a study of 80,000 individuals over 28 countries, three perceptual factors - opportunity perception; knowing other entrepreneurs; confidence in one's own abilities - were strongly linked to levels of entrepreneurship.

They also studied fear of failure, expecting to find it negatively correlated with levels of entrepreneurship. Although their analysis supported this hypothesis, they found the correlation was much weaker than for the positive perceptions. Work by Bosma et al. (2007) has also shown that positive perceptions dominate over the weak negative correlation between fear of failure and lower levels of entrepreneurship. For policy makers, this implies that policy should be directed towards enhancing the positive aspects of entrepreneurship rather than reducing the downsides.

Shapero (1982, 1984) was the first scholar to speculate on the importance of perceptions in entrepreneurship in his enduring theory of The Entrepreneurial Event.

Shapero's theory posits that an entrepreneurial event starts with a displacement such as a significant upheaval in someone's life that is often negative, such as losing a job or a loved one (Shapero, 1982). At that point, the individual is primed for action and will take up an



opportunity if it is **perceived** as both desirable and feasible.

He also notes that desirability and feasibility can interact “if something is perceived as very desirable, we may revise our estimates of its feasibility and vice versa” – but the crucial element is that the opportunity must be **perceived** to be desirable and feasible as opposed to just being objectively so. The intentions model of the next section builds off this concept.

### **4.3 Entrepreneurial intentions**

It has been shown empirically that intentions are consistently the single best predictor of subsequent behavior. The intentions-based model of entrepreneurship, therefore, takes the view that, if we are to trigger an entrepreneurial event, we must first trigger the intention. And at one level deeper, we must develop the cognitions that build the intention (Krueger, 2003 and others).

The intentions-based model of entrepreneurship, developed by Krueger (see Krueger, 2003 for main theory description), is depicted in Figure 3.

The model has been shown to be empirically robust at predicting entrepreneurial intentions and consists of six elements:

1. Social norms are “a function of the perceived normative beliefs of significant others (e.g. family, friends, co-workers) weighted by the individual's motive to comply with each normative belief” (Krueger, 2000). Social norms are influenced by exogenous factors such as people's geographical or workplace environments.
2. Self-efficacy is an individual's belief in his own competencies, as opposed to absolute skill levels (self-efficacy is discussed separately later in this chapter). Again, in Krueger's model, this is influenced by exogenous factors such as gender.
3. The perceived feasibility of starting a new venture, which is influenced by self-efficacy
4. The perceived desirability of starting a new venture, which is influenced by both social

norms and perceived feasibility.

5. Entrepreneurial intensity, which can be thought of as willingness or passion for entrepreneurship.
6. Entrepreneurial intentions are the necessary intentions for an action is take place. Entrepreneurial intentions are influenced by the perceived desirability, feasibility and the entrepreneurial intensity of an individual.

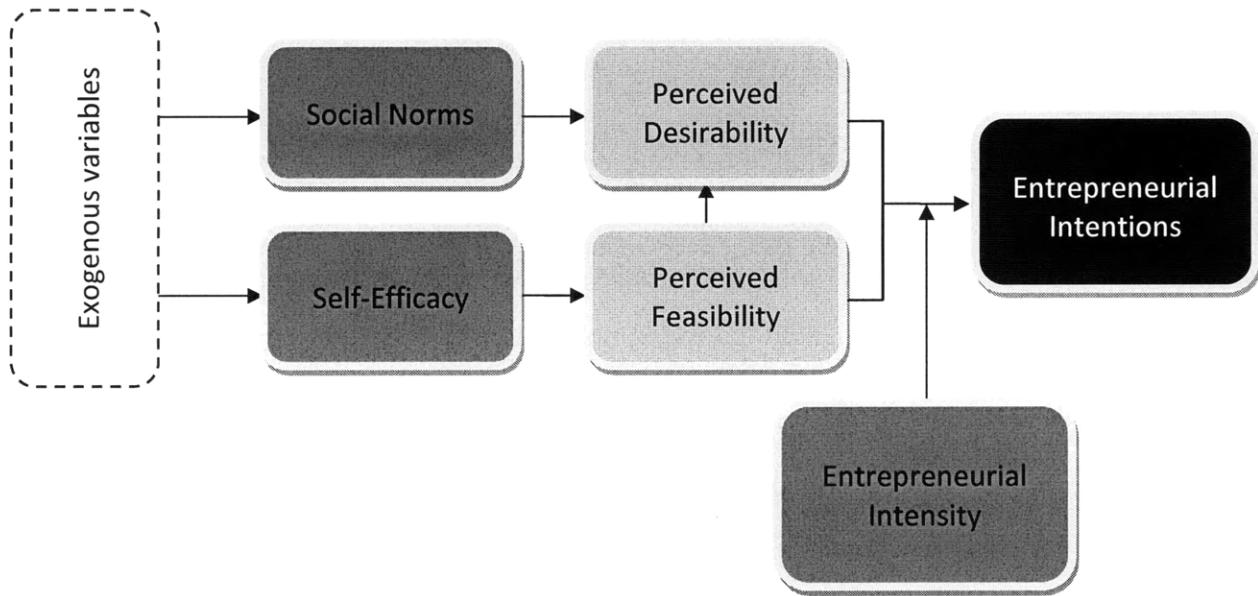


Figure 3: An intentions-based model (adapted from Krueger, 2003; Krueger & Kickul, 2006)

#### 4.3.1 Factors influencing entrepreneurial intentions

The intentions-model above presents a linear or static view of entrepreneurial cognitions. However in reality, cognitions can change over time and also vary across individuals.

A recent paper (Krueger & Kickul, 2006) demonstrated that more fundamental aspects of an individual's cognitive makeup, those which run deeper than the cognitive level we are discussing, can alter the pathways given in Figure 3. The Cognitive Style Index, one measure of these deeper cognitive structures, places individuals on a continuous scale with highly analytical people at one end and highly intuitive at the other. Figure 4 shows how the pathways within the intentions model change depending on the individual's cognitive style.

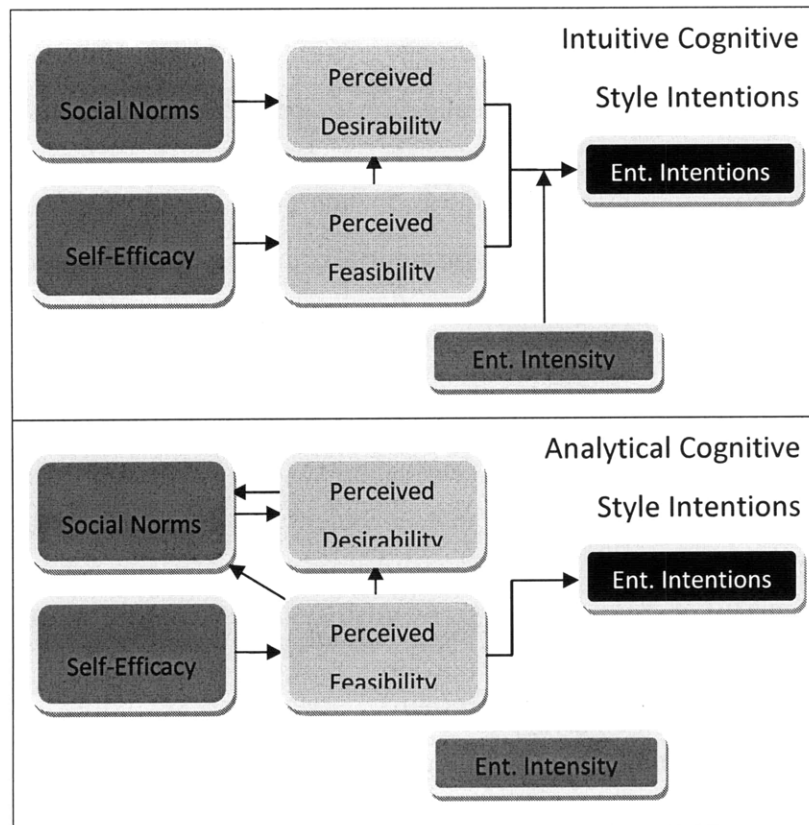


Figure 4: Intentions model variations by cognitive style

For “Intuitives,” as predicted by the original model, entrepreneurial intentions are affected by perceived desirability, perceived feasibility and entrepreneurial intensity. However, “Analytics” emphasize perceived feasibility over the other cognitive factors.

There are two key messages for policy makers from the entrepreneurial intentions model and this recent work. Firstly, that increasing entrepreneurial intentions requires increasing

perceived desirability, feasibility and entrepreneurial intensity. And secondly, that detailed analysis of a target group can provide a better understanding of the most appropriate policy options.

## **4.4 Entrepreneurial cognitions**

The next theory presented here provides a deeper understanding of the cognitive elements that underlie the core concepts in the entrepreneurial intentions model. Mitchell, Smith, Seawright, & Morse, (2000) identified a collection of cognitive scripts that are able to sort entrepreneurs from non-entrepreneurs.

From this, Mitchell et al. (2002) broke entrepreneurial cognition down into ten cognitive scripts. A cognitive script, or just “script”, is simply a set of ideas and beliefs that lead a person, in a particular context, to perform a sequence of actions (Mitchell et al., 2002) that remains roughly constant over time. So, using their theory, an entrepreneur can be identified by her ability to demonstrate that she has certain scripts.

### **4.4.1 Entrepreneurial scripts: Willingness, Ability, and Arrangements**

Mitchell et al.'s (2000, 2002) ten entrepreneurial scripts are separated into three distinct categories: Arrangements, Abilities, and Willingness. Arrangements scripts are those that cover the ability to put together the pieces of the puzzle necessary to start a new venture. Abilities scripts are concerned with the ability to assess and create new venture opportunities and they are drivers of entrepreneurial self-efficacy (Mitchell et al., 2000). Finally, Willingness scripts are associated with a commitment to starting a new venture.

As these scripts form the basis for the policy I develop in Chapter 5, I have included a detailed description of each script, under the three headings, presented in Table 2.

<b>Script</b>	<b>Description</b>
<b>Arrangements scripts</b>	
<b>Idea protection</b>	Concern possession and use of specific patents, copyrights, franchise agreements, contracts, and other isolating arrangements that serve to prevent imitation.
<b>Resource access</b>	Concern the possession and use of essential and unique social contacts; and specific financial, human, and other assets or resources necessary for new venture formation.
<b>Venture-specific skills</b>	Relate to the extent to which a prospective entrepreneur recognizes and has mastered the capabilities that provide sustainable competitive advantage for a new venture.
<b>Abilities scripts</b>	
<b>Venture diagnostic</b>	Concern the ability to assess the condition and potential of ventures and to understand the systematic elements involved in their creation.
<b>Situational knowledge</b>	Involve the ability to draw on lessons learned in a variety of ventures and apply those lessons to a specific situation.
<b>Ability-opportunity</b>	Concern the ability to see ways in which customer and venture value can be created in new combinations of people, materials, or products.
<b>Opportunity recognition</b>	Concerned with spotting patterns, problems, and solutions, which together form opportunity recognition.
<b>Willingness scripts</b>	
<b>Opportunity seeking</b>	Concerned with an openness, orientation, and drive toward seeking out new situations and possibilities and trying new things.
<b>Commitment Tolerance</b>	Include the inclination to "put your money where your mouth is" and to assume the risk and responsibility of new venture creation.
<b>Opportunity pursuit</b>	Concerned with "getting on with the task" and the belief that missing an opportunity is worse than trying and failing.

Table 2: Overview of cognitive (adapted from Mitchell et al. 2000)

Mitchell et al. (2000) found that the main differentiator between entrepreneurs and non-

entrepreneurs are Arrangements scripts: entrepreneurs have them and non-entrepreneurs do not. However, within a set of entrepreneurs, levels of Willingness and Ability scripts vary. Mitchell et al. (2002) categorized this variation by describing unique combinations of scripts as a series of eight archetypes. These archetypes are presented in Figure 5 below.

		Lower Ability	Higher Ability
<b>Entrepreneurs Higher Arrangements</b>	Higher Willingness	<b>1. Dangerous</b>	<b>2. Professional</b>
	Lower Willingness	<b>3. Arrangements only</b>	<b>4. Conservative</b>
<b>Non-Entrepreneurs Lower Arrangements</b>	Higher Willingness	5. Willingness only	6. Incubation
	Lower Willingness	7. Non-venturer	8. Ability only

**Figure 5: Entrepreneurial archetypes by cognitive script categorization (adapted from Mitchell et al., 2002)**

Interestingly, they found that non-entrepreneurs most commonly exhibited the Willingness Only archetype (#5 in Figure 5).

In their 11 country study, Mitchell et al. (2002) found that entrepreneurs exhibited all of the archetypes #1 - #4 from Figure 5, although different countries exhibited different balances of the archetypes. These results are shown in Figure 6.

While there was variation, no single entrepreneurial archetype dominated. Figure 7 shows the total numbers of entrepreneurs by archetype across the eleven countries.

Looking back at Krueger's work, this finding could perhaps be explained through underlying differences in cognitive styles which motivate the venture creation decision.

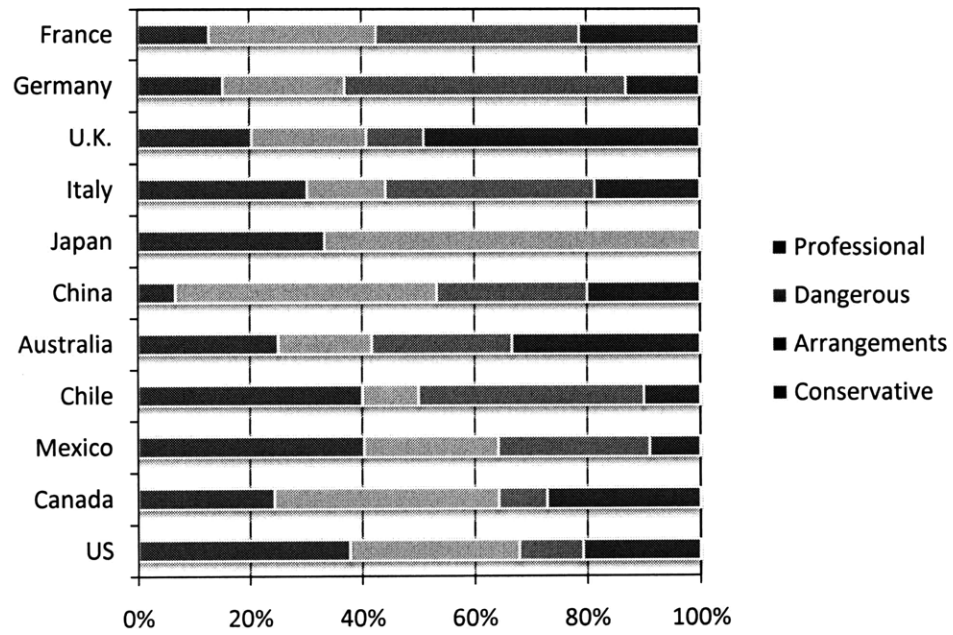


Figure 6: Entrepreneurial cognitions by country (Source: Mitchell et al., 2002)

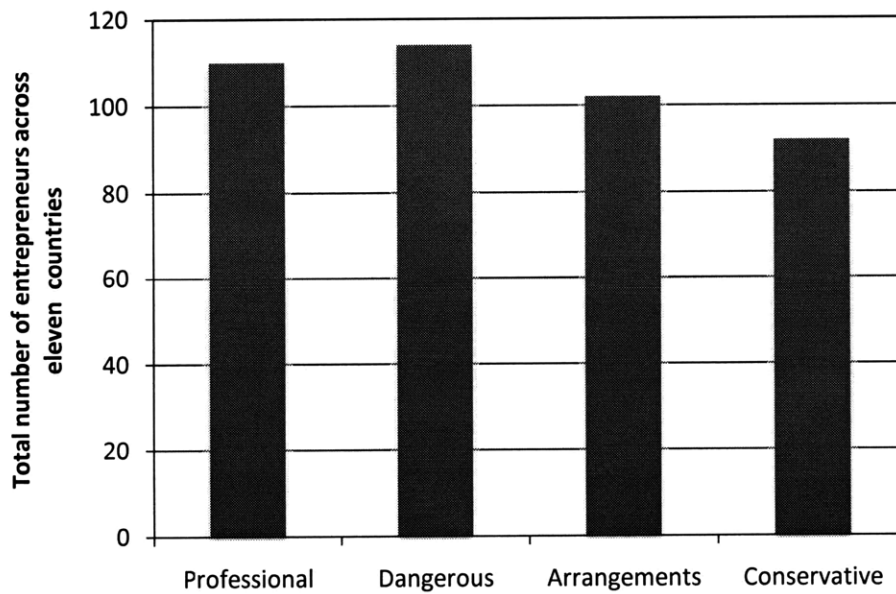


Figure 7: Prevalence of entrepreneurial archetypes across eleven countries

## 4.5 Unifying the intentions model and cognitions model

Bringing together the intentions model and cognitions model provides a starting point for developing a tool for identifying appropriate policy actions.

The intentions model and the cognitions model both have sound empirical evidence to back up their theories. Since no one, to my knowledge, has compared the two models to determine if one has a higher predictive power than the other, it seems appropriate to bring these two models together to provide as complete a picture as possible.

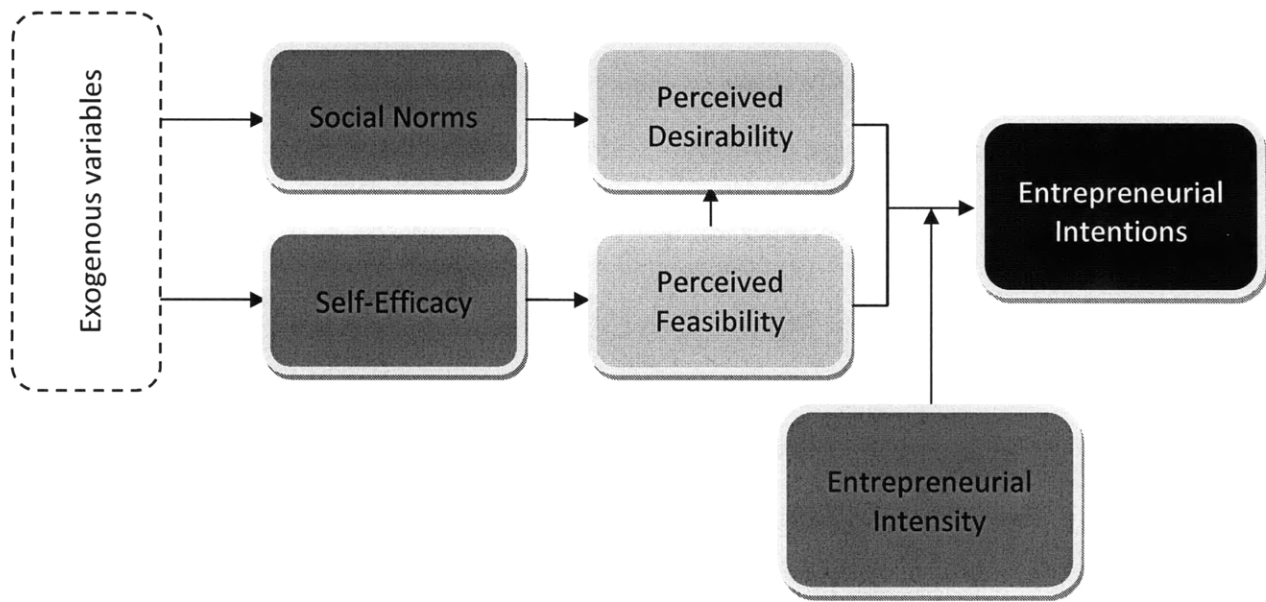


Figure 8: Combining the intentions and cognitions models

By-and-large the two models can map onto each other, as depicted in Figure 8. Mitchell et al. (2000) found that Abilities cognitions drive self-efficacy which in turn drives the venture creation decision. This is supported by Krueger's work. The concepts of Willingness and Entrepreneurial Intensity are, as far as I can discern, analogous constructs. Finally, the Arrangements cognitions are shown by Mitchell et al. (2000) to be the key determinant of an entrepreneur. Krueger, however, does not have a similar construct in his theory. In Figure 8, I have shown Arrangements leading directly into Entrepreneurial Intentions as a separate pathway – implying that Arrangements scripts must be present in order for Entrepreneurial



Intentions to occur. This may not be an accurate reflection of the cognitive pathway, and is an area for further research.

Interestingly, none of Mitchell et al.'s scripts directly impact Perceived Desirability. This may support, or be supported by, Krueger and Kickul's (2006) work that Perceived Desirability is only a factor for certain members of the population.

## **4.6 Entrepreneurial Self-Efficacy**

Entrepreneurial self-efficacy is the belief in one's own entrepreneurial abilities and is a key driver of entrepreneurial action. The concept of self-efficacy is not unique to entrepreneurship: anyone with high self-efficacy for a certain task is more likely "to pursue and persist in that task" (Krueger and Kickul, 2006 citing Bandura).

Stajkovic and Luthans (1998) undertook a meta-analysis of research on self-efficacy and showed that there was a strong correlation between success in the work-place and self-efficacy. Specifically on entrepreneurship, Chen, Greene and Crick (1998) demonstrated that higher self-efficacy leads to more entrepreneurial activity.

Although it has been speculated that self-efficacy could also be linked with over-confidence (Wadson, 2006), which would be a negative factor, Forbes (2005) found no correlation between over-confidence and self-efficacy in entrepreneurs.

### **4.6.1 Sources of entrepreneurial self-efficacy**

Erikson (2003), building on the work of Wood and Bandura, identifies three sources of entrepreneurial self-efficacy:

1. Interpretation of one's own past experiences or "mastery experiences;"
2. The observation of others, "vicarious experiments; and"

### 3. The encouragement of those around you.

Krueger (2003) states that “self-efficacy is best influenced by direct mastery experiences...[but that] vicarious learning is also well documented.” Wadeson (2006) asserts that the most powerful force is one’s own personal experiences. These findings are extremely important from a policy perspective.

In an educational setting, it has been shown that entrepreneurial self-efficacy is improved through business plan competitions (Neupert, Krueger & Chua, 2000) and even in entrepreneurship classes over the course of a single semester (Krueger, 2001). The importance of vicarious experiences also has implications for education, which is covered in Chapter 9. Finally, Shapero (1984) also notes that vicarious experiments are most readily absorbed if the entrepreneur or potential entrepreneur views the enacter of the experience they are observing as inferior or subordinate in some manner.

#### **4.6.2 Role-models and entrepreneurial self-efficacy**

Cave, Cooper, Good and Ward (in print) showed a strong correlation between role models and entrepreneurial intentions and self-efficacy in engineering students. The research was conclusive in showing that the presence of an entrepreneurial role model had a large impact on the entrepreneurial intention. However, entrepreneurial self-efficacy was correlated for some role models and not for others. The strongest correlation was with work colleagues, and the only remaining two groups<sup>5</sup> with statistically significant results were friends at university and faculty. Shapero (1984) provides some possible insight on this finding, noting the following:

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<sup>5</sup> Cave et al. examined the influence of eight potential role models: Father, Mother, Sibling, Other relative or close family friend, Faculty or other university teacher, Friend known Before university, Friend known At university, Work colleague

“Perhaps the most powerful influence on perceptions of the feasibility of forming a company comes from the observance of others. To see someone like yourself do something makes it much more likely that you can imagine yourself doing the same thing. Once Roger Bannister broke the four-minute mile, that apparent barrier was surpassed by others within months....This is not a classic case of role modeling. It is rather a case of seeing someone like yourself who did it who is no better than you are. Hundreds of interviews have elicited statements such as, “By gosh! If he can do it, anyone can do it” or “I did everything the boss did except take home the profits.”

Cave et al. and Shapero offer a different perspective from the way role models are often thought of. Role models are not necessarily lofty examples of success and greatness that enhance an abstract measure of desirability. They can be more fallible examples that are easier to relate to and act as a vicarious experience building entrepreneurial self-efficacy.



## 5. BUILDING ENTREPRENEURIAL COGNITIONS

*“Trying to understand the entrepreneurial process without considering entrepreneurs is like trying to bake bread without yeast.”*

*--Robert Baron, Professor in Management, Rensselaer Polytechnic Institute*

This Chapter works through the cognitive framework step-by-step and identifies a range of policy options that are suitable for building entrepreneurial intentions.

### 5.1 Cognitive Framework

In Chapter 4, I developed the framework shown in Figure 9 as the basis of our approach to cognitive policy making. Using this framework as a reference, this Chapter will present a series of policy options that can then be selected from to develop a policy strategy in a given situation. Chapter 6 presents the methodology for selecting from the policies developed in this Chapter.

I will group the policy options by categories of cognitions, in the order displayed in Figure 9.

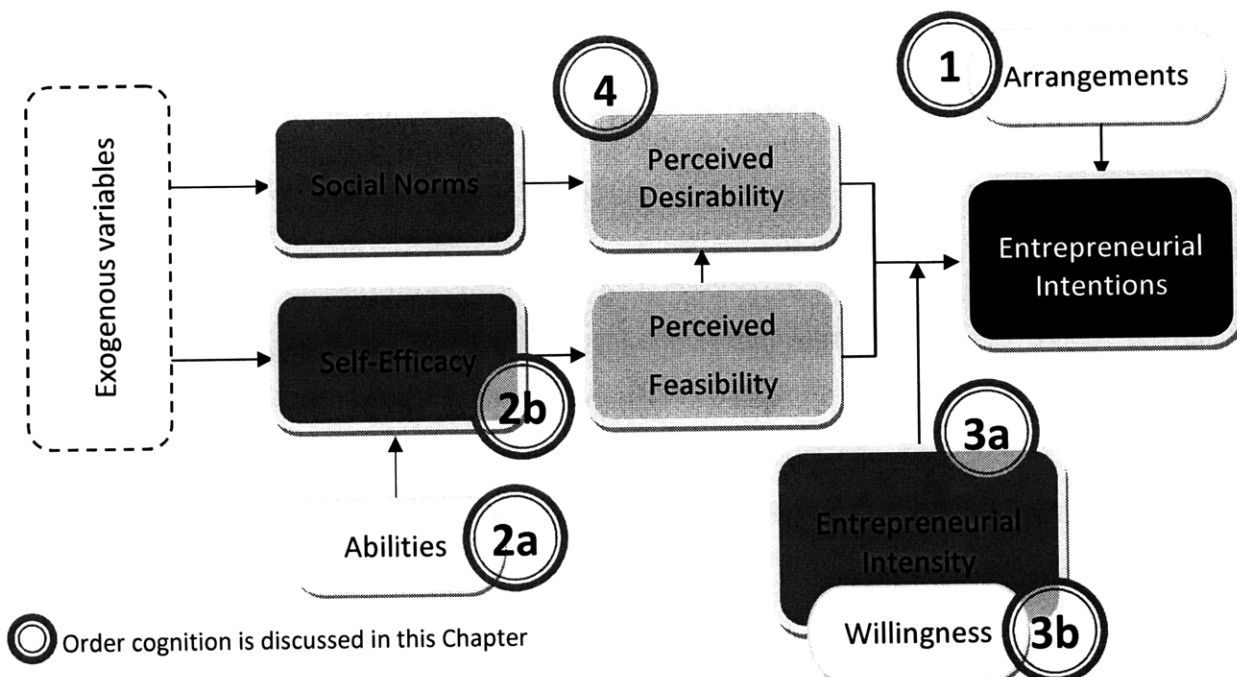


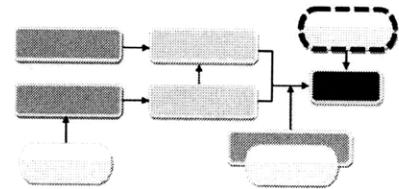
Figure 9: Entrepreneurial Cognitive Framework

Two cognitive categories are not discussed: Social Norms and Perceived Feasibility. Perceived Feasibility is directly influenced by entrepreneurial self-efficacy, and I have not found any other drivers of perceived feasibility in the literature, so I will stick to discussing self-efficacy rather than perceived feasibility. Altering social norms is outside the scope of this thesis, except to the extent that fostering entrepreneurship will, over time and if successful, lead to a shifting in social norms.

For the rest of this chapter I will use the general term Potential Entrepreneur (PE) to refer to those who will be the targets of entrepreneurship policy. Also, key policy ideas are underlined within the text for ease of identification.

## 5.2 Arrangements cognitions

Arrangements cognitions are the primary differentiator between entrepreneurs and non-entrepreneurs. They are associated with the ability to put together the pieces of the puzzle necessary to start a new venture. The three arrangements cognitions which must be in place for venture creation are:



- A knowledge of ideas that can be protected;
- An understanding of how to put together the necessary resources for the new venture; and;
- The abilities required to execute that new venture.

To foster these cognitions, there is a good deal of direct information that needs to be transferred to the potential entrepreneur; providing such information is already a common feature of many entrepreneurship policies. This is an example of traditional SME policy being extended to entrepreneurship. However, in the case of fostering entrepreneurship, we are trying to help potential entrepreneurs develop new cognitive constructs, so they can adopt this knowledge and then change their way of thinking.

### 5.2.1 Idea protection

***Possession and use of specific patents, copyrights, franchise agreements, contracts, and other isolating arrangements that serve to prevent imitation***

Within idea protection, there are three distinct areas for consideration, which I categorize as follows:

- 1) Formal protection that is provided by a legal infrastructure;
- 2) Informal protection, often termed “competitive advantage” in business, that is made up of:
  - a) Formal knowledge, including common knowledge about starting and running a company; and
  - b) Informal knowledge, including tricks of the trade and information that relates to an individual’s specific circumstances or idea.

***Formal Protection:*** The most obvious category of formal protection in the context of entrepreneurship is that of patents, copyright, and other intellectual property rights (IPR). Other legislative protections that are pertinent to entrepreneurship include anti-trust legislation and pharmaceutical drug approval processes. Government at the national and federal levels have policy directly under their purview and so can alter it. Most other policy makers seek legislative change through lobbying and advocacy efforts.

However, reforming or strengthening legislation is unlikely to foster more entrepreneurship in the short-to-medium term, predominantly because changes in legislation are relatively difficult to understand, sometimes even for policy specialists. Since potential entrepreneurs (PEs) are unlikely to be policy specialists, they will find it difficult to easily incorporate any policy changes into new or ongoing assessments of opportunities.

Rather than trying to change legislation to encourage potential entrepreneurs, which is a time-consuming and resource-intensive activity, resources may be much better spent by providing them with advice or guidance on how to navigate and accurately interpret the current status of

legislation. Providing this kind of information can come through informational booklets and websites, such as those provided by technology licensing offices. But, in order for this to be keenly understood and interpreted accurately by PEs, intensive consultation and discussion is likely to be necessary. For a PE, it may be unclear why it is necessary to understand such information and, given that they likely have not narrowed in on a venture of interest, it may also be unclear to the policy maker what kind of knowledge they should aim to provide to PEs.

However, if a PE has a strong network around them, then as opportunities emerge, they can seek the advice of experts as and when necessary. Fostering networks, in particular heterogeneous networks that contain people with a wide range of skills and backgrounds, can therefore be an effective way to provide PEs with helpful arrangements cognitions. Furthermore, policy makers may wish to plant experts in a network—employ or encourage specific experts to become part of an entrepreneurial ecosystem—if they perceive that a particular knowledge base is missing.

**Informal Protection – Formal Knowledge:** Understanding how to make a business hard to replicate and how to build in excellence are important parts of both idea protection and of building *high-quality businesses*. Both policy makers and those starting new companies need to understand this to be successful. Many great and entrepreneurial businesses such as Walmart, Ikea, and Southwest Airlines do not rely on IPR or other legislation, but instead have created unique combinations of business models, culture, operational excellence, supply chain management, and a host of other factors that make them unique in their markets. Far from being a yet another grocery store, furniture store, and regional airline, they are giants in their field and have maintained their unique competitive advantage over decades.

In a start-up environment, many things, often small, can make a company succeed or fail. For the basics of business such as sales, marketing, and finance—which every PE should have at least some appreciation of—training courses and information can help considerably. A lot of this kind of information is transmitted in business school courses on entrepreneurship. However, for those outside of the educational system, they make take new training only as a



secondary step, after they have decided entrepreneurship is something they wish to do.

However, more challengingly, idea protection is not just about trying to communicate the basics; it is about how you create that piece of magic, that new or different feature that will be special and successful in the marketplace. This kind of information is much more readily communicated through informal knowledge.

**Informal Protection - Informal Knowledge:** Informal knowledge is the kind that relates directly to an individual's circumstance. For a PE this may well be information that is not specific, but can be interpreted and re-applied by the PE to their unique circumstance. Interacting regularly with novice entrepreneurs in the early days of their venture, when a business model evolves and gets refined, provides an opportunity for PEs to see this process in action. At the other end of the spectrum, experienced entrepreneurs and business people who, over their careers and through their experience with multiple companies or projects, have learned various tricks and lessons can also provide the voice of experience and the stream of anecdotes that stick with PEs. And so, once again, this is a recommendation for networking as a tool to build entrepreneurial ecosystems. As Cross et al. (2001) point out, "research has consistently shown that who you know has a significant impact on what you know."

## 5.2.2 Resource Access

***Possession and use of essential and unique social contacts; and specific financial, human, and other assets or resources necessary for new venture formation***

My key recommendation here is, as above, for policy makers to stimulate networking and to allow individuals to find their own paths and assemble their own resources to build their companies. More specifically, the recommendation is for what Brown (S. Brown, personal communication, May 25, 2007) calls "dense heterogeneous networking": frequent contact with people from different backgrounds, disciplines, or interests. Rodan and Galunic (2004) show that, in a managerial context, the heterogeneity of networks is a key predictor of both

managerial performance and a primary indicator for innovation performance.

Internationally, there are many existing programs that provide resources, in particular capital, to start-ups, and also mentoring and business advice. Storey (2003) show that government-funded projects that supply consultants to businesses at subsidized rates have proven largely ineffective. They argue that this is likely because new entrepreneurs can't or don't value the services offered by these consultants. SpinValor, a company associated with the University of Minho in Portugal that provides start-up advice to new companies, also noted that they continually struggle to convince entrepreneurs of the value of their services, and that they generally rely on EU grants to pay for their services to new companies. This challenge again points to the critical role of informal networks. The value of information and the cost of obtaining that information are calculated extremely differently when gathered through networking rather than when treating it as a one-off economic transaction. Furthermore, input from a variety of sources may well provide better information than a single consultant can provide.

Lastly, as I already mentioned at the end of Chapter 3, informal capital is a key source of financing for new ventures. Building networks can help extend the reach of this capital and provide a lower-cost way to fund new ventures, as opposed to starting a state-run financing body, or providing tax-breaks or incentives to existing financial institutions.

### 5.2.3 Venture-specific skills

***The extent to which a prospective entrepreneur recognizes and has mastered the capabilities that provide sustainable competitive advantage for a new venture***

As with idea protection, for each idea for a new venture, there will be a specific list of skills that are required to build that venture. Many ventures overlap in which skills are needed, such as financial planning, management, and human resources. Many of these skills can be passed on in an educational setting, or, for target groups beyond school-going age, through subsidized

courses and online information. However, that requires PEs to identify themselves. Moreover, it is in the areas that don't overlap that this entrepreneurial cognitive script really lies: it is unique the capabilities that can provide sustainable competitive advantage.

It takes an individualized service to help nascent entrepreneurs get the specific skills they require. Apart from networking, discussed in idea protection, feedback and mentorship are two methods of ensuring that the PE gets this unique knowledge.

Feedback can range from formal comments of an investor upon presenting a proposal to informal bouncing around of ideas amongst friends. Networks, and in particular heterogeneous networks, are a great place for feedback. However, effective feedback will only occur in a network if proper bonds of trust have been established. This means that networks cannot be superficial, but must be viewed as communities of sharing where violating some social norms—such as theft of an idea—would be socially punished.

Feedback can also occur in other settings. A competition is a great forum to formally provide feedback to potential or new entrepreneurs. In this case, feedback must be legitimized somehow, given the lack of connection between judge and contestant. In a competitive environment, it can be harder to provide feedback that is actively listened to since, again, bonds of trust are not in place. However, bringing feedback into a competition early, and giving an opportunity to improve in response to that feedback, could be an effective tool for legitimization and provides a training ground for responding to outside critique.

Mentorship provides a specific kind of feedback, as well as an opportunity to pass on unique pieces of information. Furthermore, in the best cases, mentoring is an opportunity for the new entrepreneur to gain access to networks outside their own. Leonard and Swap (2000) point out the growing role of what they call “mentor capitalists” in the Silicon Valley entrepreneurial ecosystem as an under-appreciated yet critical factor for cultivating new entrepreneurs.

Building mentoring communities also requires strong networks that can identify mentors. Policy makers can leverage existing groups to find potential mentors. These could be groups of

businessmen, entrepreneurs, investors, or a university group. In the United States, amongst experienced and serial entrepreneurs there is a strong culture of giving back that stems, in part, from a virtuous cycle built up because they got mentored themselves early on in their career.

In Portugal and Pakistan there was a noticeable lack of this kind of activity, with the exception of former PhD supervisors in academic settings. Fostering mentorship in these context settings may require incentives from policy makers. It is unlikely that financial incentives would be helpful in this context, but appealing in a broader cultural context could be important. For example, in Pakistan there is a strong culture of giving back to the country through charitable acts. Highlighting the contribution that could be made to Pakistani society by engaging in these activities could work. Another alternative, used by many business groups, is to promote special status and recognize the achievements of individuals in return for duties such as mentorship. Groups such as the large entrepreneur's network The Indus Entrepreneurs have special Charter Member status, which comes with significant responsibilities and costs beyond normal membership, and is gained by invitation only.

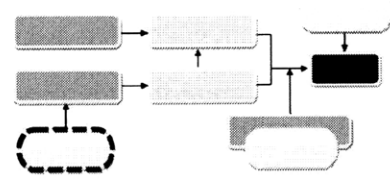
A key part of building this set of cognitions is also building entrepreneurial self-efficacy which will be discussed later.

#### **Summary of key points about arrangements cognitions**

- There is an identifiable list of information that may not be widely known or understood by potential entrepreneurs, including basic business skills, how to build competitive advantage, and specialized legislative knowledge.
- This knowledge can be provided through education, training courses, and online.
- However, the adoption and interpretation of this knowledge, which is crucial for cognitions, comes from personal interactions.
- Sources of these interactions are heterogeneous networks, feedback and mentorship.
- Heterogeneous networks may be necessary to provide access to expert advice, informal capital, novice and experienced entrepreneurs, and other business people,
- Feedback can come through informal interactions in networks or more formal mechanisms such as competitions.
- Mentorship can be extremely valuable but is potentially resource-intensive to cultivate.

### 5.3 Abilities cognitions

Abilities cognitions are drivers of self-efficacy and are associated with the ability to assess and create new venture opportunities. The four Ability cognition scripts are:



- Venture diagnostic: the ability to assess ventures and the steps to their creation;
- Situational knowledge: the ability to draw on knowledge from analogous situations and apply them;
- Ability-opportunity: the ability to recognize how one can contribute and build an opportunity; and
- Opportunity recognition: the ability to spot patterns and recognize opportunities.

Here, again, there is a great deal of how-to knowledge that can be transmitted to potential entrepreneurs. But, individuals have a “higher degree of self-efficacy when their ability cognitions are more highly developed” (Mitchell et al., 2000). Therefore, to foster entrepreneurship, it will be necessary to go beyond providing knowledge, as with arrangements cognitions, and also provide potential entrepreneurs with expert capabilities in each of these cognitions.

#### 5.3.1 Venture diagnostic ability

***The ability to assess the condition and potential of ventures and to understand the systematic elements involved in their creation***

The ability to assess ventures can be taught to some extent, but a great deal of skill comes from experience. It is worth saying upfront that it is inherently difficult to assess the potential of a new venture. If it weren't so difficult, there wouldn't be a market for venture capital, for example, since traditional financial institutions would be able to meet the needs of young

enterprises.

For an individual who is not yet an entrepreneur, trying to develop experience in assessing ventures can seem like a chicken-and-egg situation. In an educational setting, classes that provide experiential learning and real-world opportunities to assess ventures offer a lot of promise. Case-based teaching, such as that pioneered by Harvard Business School, provides a fantastic opportunity for students to gain, in a risk-free environment, a strong understanding of how to diagnose businesses. In fact, Harvard Business School exclusively uses case-based teaching through which they are “educating for judgment.”<sup>6</sup> It is worth noting that when the case method is executed properly, students really “live” the scenarios, and can be actively challenged through solving wide ranges of problems using limited information. Unfortunately, when used poorly, case-based teaching can be quite ineffective and convey less information than a regular lecture, so it is important to provide proper training to teachers if implementing a new case-based curriculum.

In a non-educational setting, assessing ventures is a fairly challenging skill to impart. However, there are other, creative ways to provide at least a starting point for developing the ability to diagnose ventures. The UK’s highly successful Dragon’s Den series on the BBC shows an interesting and popularized way to pass on this kind of information. In the Dragon’s Den, five entrepreneurs and investors invite British entrepreneurs to each pitch their business idea, with the hope of gaining up to \$100,000 of investment on the spot. Now in its fifth series, it has proved popular with the British public. More importantly, it is providing viewers with insights into how experienced entrepreneurs and investors diagnose and assess opportunities by showing the debates among the investors, and the kind of questions that entrepreneurs get asked by professionals. The show's format is appropriate because the basic steps of diagnosing

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<sup>6</sup> Education for Judgment is the title of a book published by HBS professors discussing the rationale, approach, and challenges of case-based teaching.

any venture involve a few, straightforward questions , but finding a great opportunity is tricky and so repeated exposure to this process can really help build this understanding.

### 5.3.2 Situational knowledge

*The ability to draw on lessons learned in a variety of ventures and apply those lessons to a specific situation*

Situational knowledge is, for a potential entrepreneur, an attribute with two distinct parts. The first is a natural extension of venture diagnostic abilities, where these assimilated experiences can be applied to new and specific situations. The second part takes hold once that individual starts their new venture. Then they will need to be able to take previously learnt lessons and apply them to the new situations they face in their venture. The latter of these is beyond the scope of this thesis, but many of the skills needed will likely be fostered if the former part is developed.

Mentoring and feedback, discussed in the previous section on arrangements cognitions, can provide assistance to a potential entrepreneur when, for example, she starts to develop her own ideas. Individualized feedback and well-executed mentoring provide an opportunity for the individual to develop and hone her skills while being supported through the process.

Participation in entrepreneurship competitions could also enhance situational knowledge cognitions. Competitive interaction between participants can force them to understand whether other participants' plans are better or worse than their own, and use this knowledge to adapt their own plan if necessary. This not only enhances venture diagnostic skills, as they are assessing the competitors, but also deepens that skill by forcing them to apply it.

### 5.3.3 Ability-opportunity

***The ability to see ways in which customer and venture value can be created in new combinations of people, materials, or products***

This cognition is about observing and being part of the creative process, those “eureka” moments when new insights, opportunities and connections are discovered. The successful Portuguese spin-out MicroPolis, for example, was developed when a materials professor was linked up with a physics professor, and they realized that together their research created something completely unique.

However, there is nothing magical about the process. This process will happen quite naturally as potential entrepreneurs meet more people, or meet the same people more often and they find out new things about each other. When the architects DGEW—who specialize in combining the best research coming from the social science with interior design—were asked to re-design one of Google’s offices in Mountain View, California, they were tasked with increasing the chances of serendipity. So instead of making the route to the photocopier or the kitchen more direct, they did the opposite. They made winding paths that naturally increased the chances that people will bump into each other and stop and chat.

In our case, those serendipitous moments occur through dense heterogeneous networks. When a PE is frequently interacting with people from a variety of backgrounds—not always intentionally or formally—then those moments can occur. This type of scenario is relatively easy to imagine on a campus like MIT, where students, faculty, people from industry and entrepreneurs are all wandering around. In other cases it is less easy to imagine. But community groups, political functions, and a whole host of other events are great opportunities to bring together people who wouldn’t otherwise interact.

Linking potential entrepreneurs up with potential customers, suppliers, industry experts, and others different from them, enables those conversations where a seemingly unsolvable problem from one field can be contributed to by a completely different approach. Moreover,



being part of those networks, PEs can observe this process happening in others, and so begin to appreciate the process in others.

These processes have a strong ecosystem effect, with stronger ecosystem creating more vigorous cycles of virtuous feedback. The high rates of entrepreneurship in specific universities, corporations, geographies, and ethnic minority populations show that these effects can be very powerful.

### **5.3.4 Opportunity recognition**

#### ***The ability to spot patterns, problems, and solution***

If other pieces of the puzzle are in place, there is still a need to be able to spot what is a true opportunity. While this function can be done by the entrepreneur, Brown (S. Brown, personal communication, May 25, 2007) highlights a class of people that are often forgotten within discussions on the entrepreneurial ecosystem—that of an explicit “idea spotter”. Idea spotters could be from many parts of the entrepreneurial ecosystem; they could be a customer, another entrepreneur, or just a friend. In any case, if they are a great idea spotter, they will most likely have Arrangements and Abilities cognitions. To put it another way, they may not have Willingness Cognitions and so may not be actively involved in a venture, but they do have the keen understanding necessary to expertly spot a good idea.

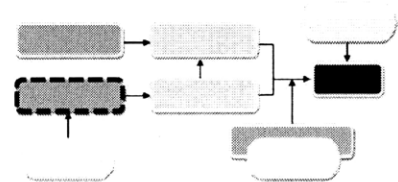
Policy makers should also recognize that idea spotters might not be a mentor or a person that ends up being linked with a venture; they might simply be a catalyst. Above and beyond the other steps that have been taken, this is again a call for heterogeneous networking. As US Secretary of State Donald Rumsfeld so elegantly put it, “there are also unknown unknowns—the ones we don't know we don't know” (Rumsfeld, 2002) and we must take this into account when building entrepreneurial policy (and security policy) since, at the end of the day, we are trying to create novelty.

**Summary of abilities cognitions**

- The abilities cognitions split into two inter-related pairs.
- For venture diagnostic and situational knowledge, exposure to diagnosis of ventures and application of that ability work together; ability-opportunity and opportunity recognition are similarly synergistic.
- In an educational setting, venture diagnostic ability can be built through case-based teaching and experiential learning. Outside of this environment, more creative measures, such as entrepreneurship focused television shows, may be necessary.
- Abilities cognitions can then be cemented through participation in competitions, feedback, and mentoring, which all provide supportive environments in which a PE can develop her skills.
- Ability-opportunity and opportunity recognition are primarily stimulated through dense heterogeneous networks.
- Idea spotters can also be used to help catalyze more opportunities.

**5.4 Building entrepreneurial self-efficacy**

As described in Chapter 4, self-efficacy is a powerful tool in the cognitive toolbox. It is not only linked to venture creation, but also to venture success. Perceived self-efficacy is the crucial factor that turns knowledge into action. An individual has to first recognize that they have abilities, and then truly believe in these abilities, if they are to be acted on.



We know that the three key sources of entrepreneurial self-efficacy, in order of influence, are: mastery experiences, vicarious experiences, and social persuasion (see Chapter 4). For policy makers, this means that the entrepreneurial environment should provide actual or vicarious ways for a potential entrepreneur to acquire and hone his skills. Note that the policy options outlined for abilities cognitions all contain elements of actual or vicarious experiences.

Encouragement also has a key role. As skills develop, the potential entrepreneur may start to have ideas of her own; getting feedback and encouragement can foster and guide this process,

and enhance her beliefs about her own capabilities. However, a supportive environment, while often talked about in policy documents (e.g. National Governors Association, 2004), is rarely translated into policy actions. The reason, I believe, is that it is unclear what it means to have a supportive environment. Many of the policy recommendations in this thesis, I believe, work towards that environment, but I have not been able to find any useful options for directly creating supportive environments. It seems that it's easy to recognize a supportive environment when you see it, but hard to point out what's missing when it's not there.

If policies are to foster new entrepreneurial opportunities, particularly in climates lacking a strong existing ecosystem, this brings new challenges and a need to think critically about how policies can provide vicarious opportunities and catalyze the virtuous cycles that result from building all the entrepreneurial cognitions.

Furthermore, if a policy-maker is in a relatively un-entrepreneurial climate, then traditional mastery experiences—such as individuals participating in a start-up as an employee before gaining the confidence to build their own—will be hard to come by. So policy-makers must act deliberately to build mastery and vicarious experiences for their target group. There is not necessarily a clear line between what constitutes mastery experiences and vicarious experiences.

The goal is to create entrepreneurial self-efficacy. There are two starting points: one in which a potential entrepreneur already has the skills necessary to build a new company, but doesn't realize or acknowledge it, and another scenario in which a potential entrepreneur is missing some skills.

The desired end point is for an individual to have, and to understand that they have, the skills necessary to start, or be part of, a new venture. From a policy perspective, outside of an educational environment, the options for achieving this goal are fairly limited since there are only so many ways to enable people to experience something, vicariously or first-hand.

I have developed five potential policy options for vicarious experiences that show the potential

for creativity in this area:

1. Developing relationships with entrepreneurs and learning about their experiences and, over time, sharing their journey, is a great way to open up individuals to vicarious experiences of entrepreneurial actions and to build entrepreneurial self-efficacy. Moreover, as we've discussed these relationships also bring about knowledge transfer, can generate new company ideas, and provide mentoring. However, if a specific target environment is severely limited in terms of entrepreneurship, it may be challenging to achieve the density of entrepreneurs required to develop meaningful relationships through which to share this information. Target groups should be selected that are small enough to start this minimal interaction, but if this is not possible, there are other options, as we will discuss below. Over time, if successful, the volume and density of entrepreneurs can grow.
2. Encourage people to get involved in leadership positions in their community and to build new projects or run events. This not only provides an opportunity for people to get involved in community service, but also shows them that they have the skills necessary to bring together an event, or service, or activity.
3. Get professionals with specific skills to participate in business development programs. If there is an existing small business support program in the area, bringing in professionals to act as consultants to support small businesses can enhance those small businesses—an already existing policy goal, if a support program is there. But, if accompanied with additional training, networking, or other support, this approach could help to foster an understanding that the consultants too have the skills required to start a business. So, for example, a design specialist could get matched with a small company to help them with promotional material. In addition to working with the company on the specific project, additional exchanges of information are encouraged to take place which help transmit the information that the original consultant could also run their own enterprise. They might be working independently at the time and this could help foster the desire to expand or, if working in an existing company, this could foster beliefs for later. However, if consultants are working in an existing company, steps would need to be taken to ensure that

encouraging entrepreneurship is not viewed as negative by the company. Consultants in general are well-placed to foster entrepreneurial self-efficacy since they often work in a large number of settings and get exposed to many different companies and types of people, and their work often involves improving and assisting companies, so they should already have some level of belief in their ability to add value to situations.

4. In working within a target group, getting people to understand and re-assess their existing personal experiences and evaluate them for skills required to launch their own idea could provide something close to a mastery experience—even if they didn't acknowledge it the first time around. For example, Shell's LiveWIRE program, aimed at promoting entrepreneurship in under-30s, has the following quote on their introductory page (<http://www.shell-livewire.org/thebigtrip/FindingYourself/>): "Whatever your history, you'll have picked up some valuable skills along the way—it's just a case of identifying and using them to promote yourself... Puzzled?... Well, if you set your alarm clock last night, got up on time today, got ready and had breakfast, collected the necessary books and papers and got to a lecture on time, then you have demonstrated skills in forward planning, organisation [sic], decision making and time management! Surprised? Well, if you boiled the kettle, toasted some bread and ironed a shirt at the same time, then you have also shown the ability to multi-task!"
5. Finally, I come back to television programs such as Dragon's Den, which I mentioned in discussing Venture Diagnostic ability. Dragon's Den conveys specific information about the basic key elements of whether a company is viable or not. However, other forms of documentary television could be used to transmit more information about entrepreneurship. Following young companies along their journeys—through the highs and the lows—would, in my opinion, make compelling viewing and be a great way to enable people to understand what goes into a start-up as well as providing the opportunity for people to believe that, as Shapero (1984) put it "if he can do it, so can I."

### **5.4.1 Target groups for mastery experiences**

Providing target groups with experiences that are as close as possible to really doing-it-yourself will be the best opportunity to build self-efficacy. This means actually spending time working with an entrepreneurial company, working in a team on a new venture idea, or in some way devoting meaningful time to being part of an actual change.

There are a number of groups that are available for such experiences such as students, unemployed persons, part-time workers, professionals on sabbatical, and stay-at-home parents. If a target group has available time, then policy makers have a unique opportunity to both provide value to companies by pairing them with a low-cost labor source, and to provide entrepreneurial mastery opportunities for their targets.

To thrive, a program that works in this area must make sure to add value to companies. Managing volunteers and new workers is extremely time-consuming, so any resource-strapped company must gain some value for the company to agree to participate in the program. Good practice involves defining clearly the goals of the project upfront, and managing expectations carefully and transparently. Classes, such as e-Lab and i-Teams at MIT, offer these kinds of projects to students but have clear guidelines and openness about the scope of what can be achieved in the course of the project, by both the company and the students. These classes and projects are also heavily mediated through the professor. But when executed well, as e-Lab and i-Teams are, they can provide profound experiences for the students.

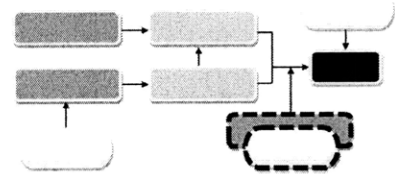
Lastly, in a student setting there is the opportunity to set up and run student organizations which provide excellent leadership and organizational challenges, as well as offering an opportunity to give back to the university or wider community in some way.

### Summary of entrepreneurial self-efficacy

- Provide mastery and vicarious experiences.
- Possible sources for vicarious experiences include networking, community leadership, consulting with small businesses, re-evaluating existing life experiences, and documentary television.
- Certain target groups lend themselves towards mastery experiences that could be rewarding for them and for the ventures or companies they work with or assist.

## 5.5 Entrepreneurial Intensity and Willingness Cognitions

Entrepreneurial intensity is “is the degree to which entrepreneurs are willing to exert maximum motivation and effort towards the success of their venture” (Krueger & Kickul, 2006).



Willingness cognitions are highly complementary to entrepreneurial intensity, with the willingness cognitions simply bringing additional clarity to what makes up Entrepreneurial Intensity. The three key willingness cognitions from the cognitions model are:

- Opportunity seeking: An openness, orientation, and drive toward seeking out new situations and possibilities and trying new things.
- Commitment tolerance: The inclination to assume the risk and responsibility of new venture creation.
- Opportunity pursuit: "getting on with the task;" the belief that missing an opportunity is worse than trying and failing.

### 5.5.1 Opportunity seeking

***An openness, orientation, and drive toward seeking out new situations and possibilities and trying new things***

Opportunity seeking can stem from both positive and negative events in an individual's life.

Shapiro (1984) hypothesized that an entrepreneurial event will be linked with a displacing event in someone's life, often a negative one. Hofstede et al. (2004) also showed that dissatisfaction was a major driver of entrepreneurship. I have also found this to be true in most of my discussions with entrepreneurs, although not all. For example, Madalena Alves, in Portugal, founded Ambisys from her work as a Professor at the University of Minho. She does however remain a full-time faculty member at University of Minho, rather than having pursued the venture full-time. This is also seen in many faculty-entrepreneurs at MIT, and presumably indicates that they are content in their current position. In part, they are not undergoing displacement—although there is more to it than this.

From a policy perspective, labor market deregulation was cited by Audretsch et al. (2002) as having a positive effect on entrepreneurial activity. More dynamism in the labor market might be an interesting example of how a typically large macro-policy issue can have cognitive impacts. However, care should be taken not to create negative displacements through, for example, creating unhealthy working environments. There are also macro-policies that create positive opportunities for labor market dynamism, such as portable pension schemes. Most European countries, for example, have such schemes. However, many European countries also display low-levels of entrepreneurial activity. And so it is important to realize that macro-economic policies cannot have a direct impact on entrepreneurial cognitions and therefore are unlikely to affect levels of entrepreneurship in the short-to-medium term.

Conversely, policy makers could stimulate positive displacements that directly impact individuals' cognitions. For example, policies could encourage high-school leavers to take a gap-year before going to university, or foster mid-career opportunities such as Volunteer Services



Overseas.<sup>7</sup> I was fortunate enough to be the beneficiary of such a policy, when the UK government teamed up with MIT through the Cambridge-MIT Initiative. I was part of an exchange program, allowing me to spend a year of my undergraduate studies in MIT, which changed my horizons and outlook on life and made me realize that there were opportunities that I had not ever considered before. This personal experience is also borne out by empirical evidence. Higgins (2001) showed that “the greater the number of career alternatives an individual obtains, the greater the likelihood that he or she will change careers.”

### 5.5.2 Commitment tolerance

***The inclination to "put your money where your mouth is" and to assume the risk and responsibility of new venture creation***

Commitment tolerance is a complex issue. However, the work of Prospect Theory and Palich and Bagby (1995) provide some important lessons. Palich and Bagby showed that entrepreneurs are not more risk-tolerant or risk-seeking than other individuals. They simply frame choices differently.

Re-framing the risk-reward profile of entrepreneurship as a career choice may stimulate more entrepreneurship in individuals if current social norms depict it as an unwise choice. Doing this requires targeting specific groups and understanding their specific concerns to elucidate which messages need to be communicated.

For example, within the University setting in Portugal there are distinct differences between the concerns of an active faculty member such as Madalena Alves (AmbiSys) and those of the PhD students. The rewards they are looking for—and the risks they face—are different, so messages must be targeted to specific groups. For Alves, the rewards she seeks are seeing her technology

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<sup>7</sup> VSO places professionals in developing countries to work on a project with a specific community for a set amount of time, providing a stimulating experience for the individual and a service to a under-served community.

enter the market place and helping people, and she has to balance this with her desires to continue as a faculty member. For PhD students, the choice is more of a career choice, so the opportunity must be presented in relation to other career options.

### 5.5.3 Opportunity pursuit

***Concerned with "getting on with the task" and the belief that missing an opportunity is worse than trying and failing***

Defined as distinctly different from commitment tolerance by the cognitive theory, opportunity pursuit encompasses the decision to "go for it." However, it is part of the continuum of the above actions.

Once again Palich and Bagby (2005) provide insight into the problem. But in this case, policies must help PEs to accurately frame specific opportunities. The challenge of accuracy is crucial because policies that push people to try to exploit poor business opportunities would, of course, be counter-productive.

This step, like others, requires mentoring and feedback. The use of competitions may also drive opportunity pursuit. But, again, strong feedback mechanisms are essential to ensure that real opportunities are being developed and that learning is being provided. In my own case, participation in the MIT 100k Entrepreneurship Competition and the encouragement I gained from that definitely left me with the feeling that I had a good idea for a business, which I should try to execute.

In a healthy entrepreneurial environment, seeking of opportunities and commitment to them become very intertwined. Entrepreneurs develop ideas, throw them out, re-develop and refine them, through networking, contact with customers, and other conversations. This process, in itself, develops commitment tolerance and opportunity pursuit by allowing the individual to see the possibilities in action and the ideas to evolve organically; what was once a decision whether to pursue a new idea turns into whether a PE should pursue that idea in this way or a different

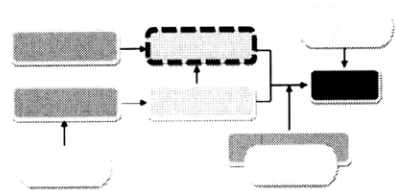
way.

**Summary of entrepreneurial intensity and willingness cognitions**

- Fostering an individual's opportunity-seeking behavior and increasing their commitment tolerance will increase the likelihood that they will make an entrepreneurial decision or form an intention towards entrepreneurship.
- Opportunity seeking behavior can be encouraged through positive displacements, such as exposing individuals to new horizons. This could be through career counseling, work or study abroad, volunteering, a horizontal shift in a company, and many other possibilities depending on the particular individuals.
- Re-framing of the risk-reward profile of entrepreneurship and accurate framing of opportunities will help drive the willingness to start ventures. Feedback and mentoring will be useful in (re-)educating PEs in this way.

**5.6 Perceived desirability**

Desirability is an inherently individualistic notion. From a policy perspective, this means that the policy must have a target, which will be elaborated on in Chapter 6. However, the nature of policy is that it tends to be a generalization that serves a



group of people, rather than being individually targeted. Even within a target group—such as students at a particular university, or the unemployed visiting a specific government office—there are likely wildly differing perceptions of what is desirable. This means that the policies must be targeted at bringing individuals into situations where they can have their own experiences, such as the “gap year” option as a displacement that can foster entrepreneurship. Another example would be bringing a target population together with all elements of an entrepreneurial ecosystem—mentors, peers, alumni, potential clients, etc.—which can allow individuals to see new perspectives and opportunities in the light of their own desires.

Krueger (2000) notes that some explicit cues can enhance desirability. Two already well

exploited policy options that provide these explicit cues are the use of role models and prizes or competitions. Success stories will enhance desirability if the outcome is a match for that of the individual. However, as desirability is individualistic, and it requires money and effort to publicize and highlight success stories, resources maybe better spent fostering networks and connections which enable individuals to find their own success stories.

#### **Summary of perceived desirability**

- Desirability is an inherently individualistic characteristic, so a generic policy prescription may struggle to influence desirability unless it is a policy that aims to provide an individual experience.
- Policies that can influence desirability include networking, competitions, role models and prizes.

## **5.7 Summary of cognitive policy options**

The policy options developed in this Chapter are summarized in Table 3. These include: building networks, providing how-to knowledge; exposing individuals to new horizons; developing role models; running business plan competitions with strong feedback loops; promoting mastery and vicarious experience; and even documentary television.

Specifically within an educational setting there is a lot that can be achieved. The use of case-based teaching, the promotion of student groups, and the opportunity to work with real companies on real problems, but in a controlled environment, are powerful tools for enhancing skills, self-efficacy, and arrangements cognitions that are key drivers of entrepreneurial intentions.

However, if a policy maker could only do one thing, the most valuable thing would be to build new heterogeneous networks that stimulate new conversations and ideas, access to new resources, feedback and an opportunity for vicarious experiences.

In the next Chapter, I outline a framework for how to develop complete cognitive policy

recommendations that brings in a consideration of stakeholders and the policy targets. Chapter 7 discusses the implications of this set of policy options as well as some of the potential challenges of implementation for policy makers.

Cognitive concepts	Potential policy options
<b>Arrangements cognitions</b>	
<b>Idea protection</b>	Guidance (over reform) for Intellectual Property Rights; education, training and information on building barriers to entry; networking with experienced entrepreneurs and business people
<b>Resource access</b>	Heterogeneous networking; extending the reach of informal capital
<b>Venture-specific skills</b>	Individualized feedback; mentoring
<b>Abilities cognitions</b>	
<b>Venture diagnostic</b>	education, training and information with how-to knowledge; provide experience using real cases – through education or television; feedback and mentoring on specific opportunities
<b>Situational knowledge</b>	engage industry groups; create Special Interest Groups within networks; foster heterogeneous networking
<b>Ability-opportunity</b>	Foster links between diverse groups; heterogeneous networking
<b>Opportunity recognition</b>	Recognition of idea-spotters as an important and unique constituent; heterogeneous networking
<b>Entrepreneurial self-efficacy</b>	
<b>Entrepreneurial self-efficacy</b>	<i>Vicarious experiences</i> – networking; community leadership; encouraging consultancy for small businesses; direct work with target group to re-frame existing experiences; documentary-based television to communicate entrepreneurial journey <i>Mastery experiences</i> – specific target groups (students, partially or unemployed) are available for mastery experiences through project-based learning and short-term or part-time work-experiences
<b>Entrepreneurial intensity and willingness cognitions</b>	
<b>Propensity to act</b>	Create opportunities for positive, horizon-broadening, displacements such as work experience, travel abroad, sabbaticals
<b>Opportunity seeking</b>	Create individualized experiences which enhance individual's perceived desirability; judicious use of competitions and role models
<b>Commitment Tolerance</b>	Re-frame risk-reward profile of entrepreneurship for target group through communications messages and networking
<b>Opportunity pursuit</b>	Work with individuals – through feedback and mentorship - to accurately frame specific opportunities.
<b>Perceived desirability</b>	
<b>Perceived desirability</b>	Networking and competitions can provide individualized experiences which enhance desirability. Role models and prizes can also be used to increase status.

Table 3: Summary of cognitive policy options

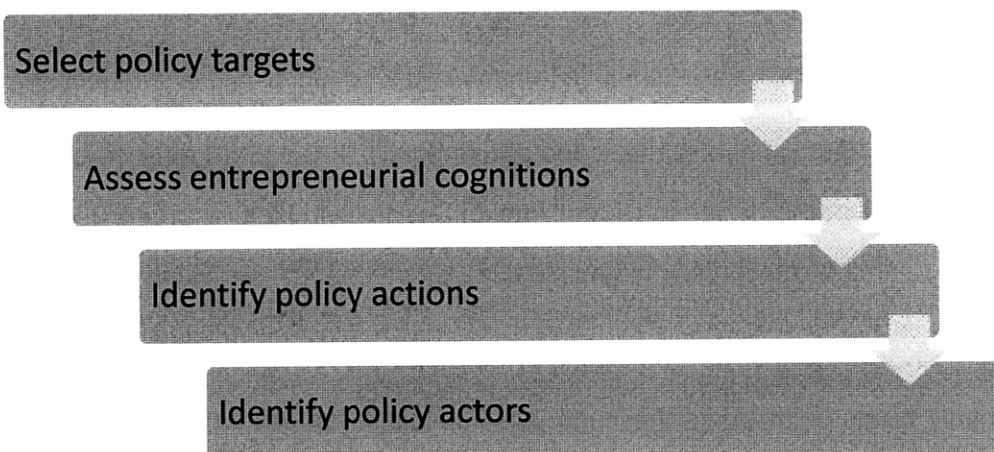


## 6. METHODOLOGY FOR COGNITIVE ENTREPRENEURSHIP POLICY

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In this chapter I provide a methodology for how to implement cognitive policy. This extends the set of policy options developed in Chapter 5 into a complete framework that is my cognitive approach to entrepreneurship policy. The methodology consists of four simple steps, shown in Figure 10, that are vital to building actionable and effective cognitive policy.

The take-home message of this approach is that for cognitive entrepreneurship policy to be effective, it must target specific groups. The second part of the methodology will be largely familiar to experienced policy-makers and others who are accustomed to stakeholder analysis and policy implementation.



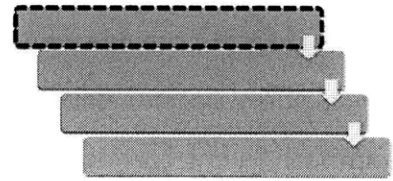
**Figure 10: Overview of cognitive policy methodology**

While policy strategies are developed by going through the steps of this methodology as shown in Figure 1, creating the policy recommendations involves working backwards through the process. That is, a cognitive policy recommendation will take the form: An actor, through a policy action, influences an entrepreneurial cognition within a specific target group.

To make this process less esoteric, in Chapter 8, I apply this methodology to a case study of the MIT-Portugal program to demonstrate how policy recommendations can be developed in practice using a cognitive approach.

## 6.1 STEP 1: Select policy targets

In the target environment, there could be any number of identifiable groups that are potential entrepreneurs. But to build effective cognitive policy, it is essential to choose a specific group to target. As discussed in Chapter -1401944899, one of the core policies from a cognitive approach is enhancing the connections between people through meaningful and trust-driven connections. Without a target, there is no way of identifying what the specific needs of a group are and therefore no way of identifying what the best policy approaches are. Chapter 7 also provides impetus to this need for a target by running through a case study and showing how two target groups that are similar in many ways ways—faculty and PhD students in Portuguese universities—have different needs and require different policy strategies.



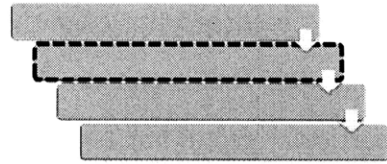
The task of judging who to target is beyond the scope of this thesis. It is a political decision that should be driven by the goals and broader considerations of the policymaker.

The cognitive approach can provide some assistance, though, by narrowing down a wider list of candidates, e.g., high-school students in Cambridge, working mothers in Minho, or gem-stone producers in Karachi. Working through the cognitive approach for each target group will provide separate sets of policy recommendations. From this, policy-makers can then select the most appropriate target group based on whatever the policy-makers broader goals or constraints might be. A goal might be developing policies that can target multiple groups at once. A constraint might be the need to target those groups that can be affected most cost-effectively. Or picking a target group could be based on other policy considerations, such as equity or equality.



## 6.2 STEP 2: Assess entrepreneurial cognitions

Next, target groups need to be assessed for their levels of entrepreneurial cognitions. This can be done qualitatively or quantitatively.



A qualitative process involves holding in-depth and unstructured or semi-structured interviews with not only the targets, but also other relevant stakeholders. Then assessors can score the target groups by working through the four main areas from Chapter 5: arrangements cognitions; willingness cognitions and entrepreneurial intensity; self-efficacy and abilities cognitions; and perceived desirability. This process can also be done with relevant stakeholders and target groups to uncover and eliminate biases in any one assessor.

A qualitative process can also be used to focus the more resource intensive quantitative approach.

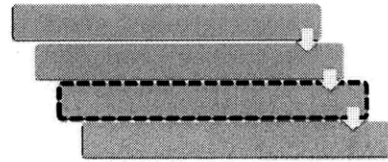
Quantitative assessment can also take place using the methods employed by Krueger (2000, 2003), Krueger and Kickul (2006) and Mitchell et al. (2000, 2002). This quantitative assessment is employed only with the target group. It may also help to identify sub-sets of the target group that fit particular cognitive profiles.

Quantitative and qualitative methods can be used complementarily to identify misperceptions amongst different stakeholders.

As in Step 1, there is potential for iteration here. If an initial run-through of the methodology with a qualitative assessment in this step then leads to additional stakeholders being identified in the final policy plan, the process can be repeated from this step. Include the newly identified stakeholders in this assessment step can show whether additional changes are necessary.

### 6.3 STEP 3: Identify policy actions

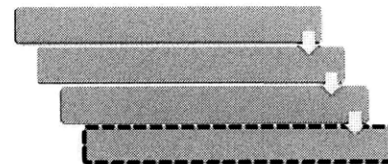
Having assessed the cognitive profile of the target group, this next step focuses in on the target group. Knowing where a particular group has higher or lower levels of a certain class of cognitions, the most appropriate policy actions to foster those entrepreneurial can be selected.



As highlighted in Chapter 5, the policy selection process will be influenced by the individual circumstances of target groups such as their ability to participate in master experiences. It will also be affected by the range of policies that are implementable by the policy maker.

### 6.4 STEP 4: Identify policy actors

The final step in the cognitive approach to policy making is the identification of policy actors to act as the sources for entrepreneurial cognitive elements. Policy actors are within the influence of policy-makers and are able to influence the entrepreneurial cognitions of the target. The actors might be individuals such as faculty members, business people, investors or lawyers. The actors might also be institutions or other entities such as the media, a technology licensing office, or a government body.



These actors are members of the entrepreneurial ecosystem who possess the relevant resources, experiences, or expertise to bolster a particular cognitive element. Once the key cognitive policy actions have been identified, policy-makers can hone in the policy actors required to bolster for those elements. Figure 11 (a repeat of Figure 1) shows a list of potential policy actors for a given entrepreneurial environment.

BIRD - METHODOLOGY FOR COGNITIVE ENTREPRENEURSHIP POLICY

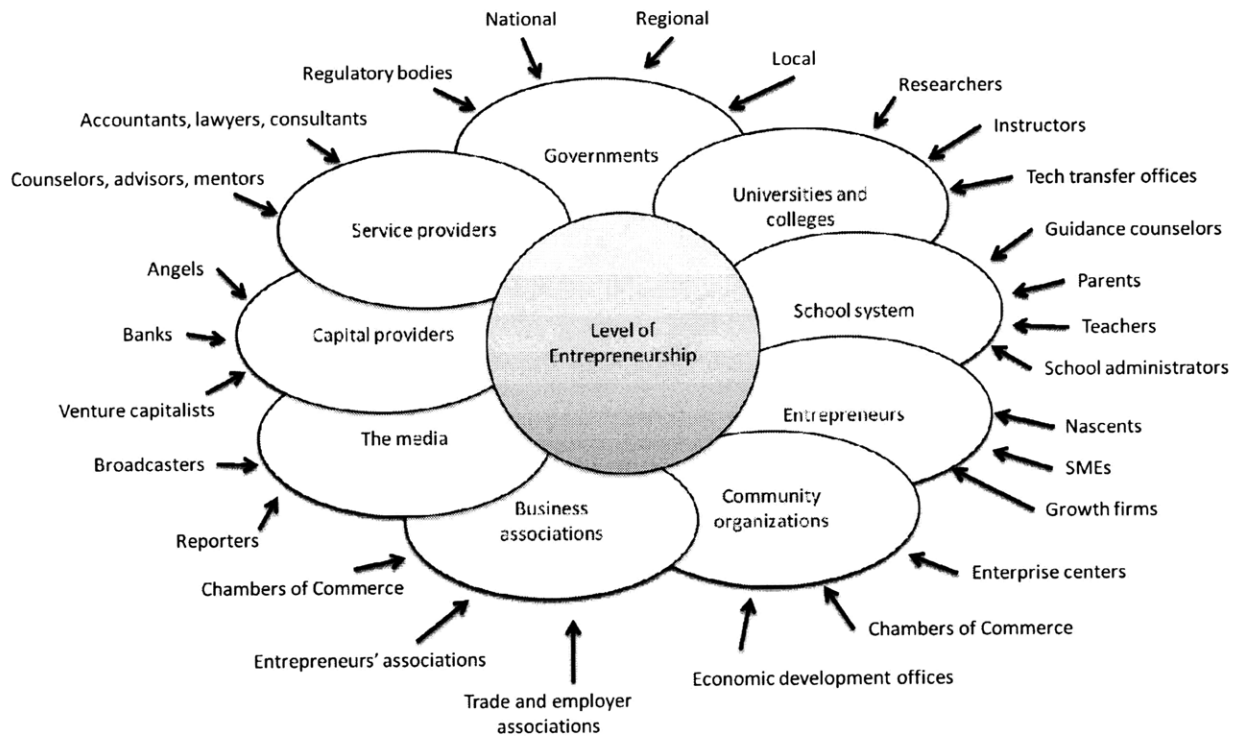


Figure 11: Potential policy actors (adapted from Lundström & Stevenson, 2005)

At this point, one last iteration may occur if the identification of new policy actors brings to light possibilities or refinements for new policy actions.

Identifying actors completes the process of assembling a policy recommendation. However, as discussed, further iterations may occur and this complete process is shown in Figure 12 below.

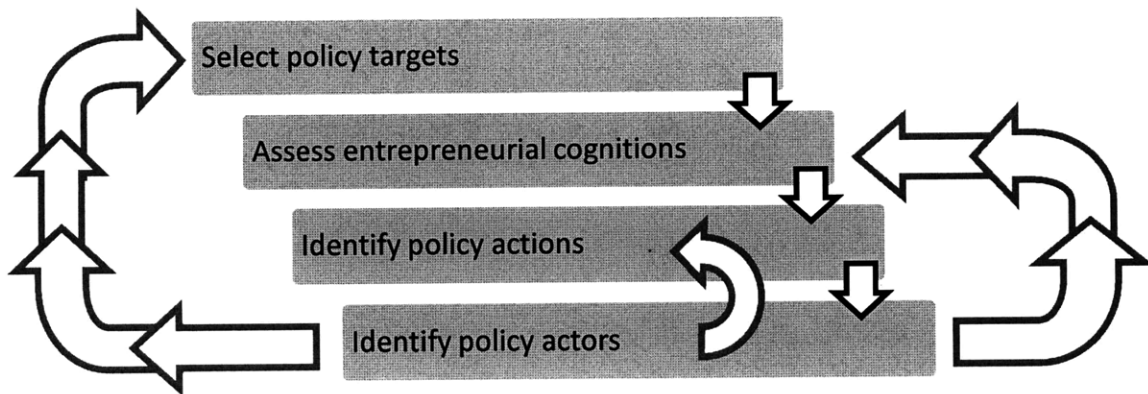


Figure 12: Complete methodology for cognitive approach to policy making



## 7. IMPLICATIONS OF COGNITIVE POLICY OPTIONS

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This Chapter discusses the implications of my framework for a cognitive approach to entrepreneurship policy and the cognitive policy options I developed in Chapter 5 (summarized in Table 3 on page 69). I call for an emphasis on entrepreneurship policy as a distinct policy class with a much heavier emphasis on the unique characteristics of potential entrepreneurs as a target for policy. The second half of the Chapter presents some of the challenges and considerations for implementing cognitive policy options.

### 7.1 Implications

#### 7.1.1 Entrepreneurship policy as a distinct class

In Lundström and Stevenson's (2005) entrepreneurship policy framework they outlined 6 key areas where current entrepreneurship policy is focused:

1. Promotion of entrepreneurship
2. Entrepreneurship in the education system
3. Easing entry, early-stage survival/growth and exit
4. Access to start-up, seed, and early-stage financing
5. Business support for start-up and early-stage growth
6. Policy for target groups

The list of policy options I have outlined show that when building entrepreneurial intentions, it is Options 1 and 2 of Lundström and Stevenson's (2005) framework that are most critical. However, as we saw in Chapter 3, it is these two options that governments frequently execute least well at.

As Lundström and Stevenson (2005) highlight, a lot of entrepreneurship policy has been developed by adding to existing SME policy rather than developing explicitly separate

entrepreneurship policy. This has led to policy strengths in areas 3 through 5.

However, I hope that my cognitive approach reinforces the idea that entrepreneurship policy needs to be a distinct class of policy on its own. Entrepreneurship policy needs to be implemented in distinctly different ways from SME policy. These two policy areas do have some overlap, such as the need for information on how to form a company, and some synergies, such as the need for financing, which is often under-provided by the markets for both SMEs and entrepreneurial ventures. However, if we want to foster more entrepreneurship, entrepreneurship policy must act long before an individual requires financing or starts to found their company. It begins long before “somebody wakes up in the morning and says ‘maybe I’ll start a business today’” (Reynolds). It begins by working with target groups, who may not have even explicitly identified themselves as having entrepreneurial intentions, and it plants the seeds of entrepreneurship.

This makes it distinct from SME policy since the targets of policy are not identifiable through their presence as legal entities and, in many cases, do not identify themselves.

If, on the other hand, policy makers are not trying to stimulate more entrepreneurship, but rather are trying to support existing entrepreneurs, then grouping this activity with SME policy may be appropriate since existing entrepreneurs are also SME founders and managers. However, there are many unique aspects to entrepreneurs, which means that their needs may be better served by, again, working with entrepreneurs as a separate class for individuals.

Moreover, the vast majority of policy missions relating to entrepreneurship that I have seen (e.g. [http://ec.europa.eu/enterprise/enterprise\\_policy](http://ec.europa.eu/enterprise/enterprise_policy); <http://www.entrepreneurship.gov>; <http://www.tie.org>), whether from a university, a private group, a region or a nation, focus on fostering entrepreneurship or the creation of new entities.

### **7.1.2 Need to identify and implement policies locally**

Entrepreneurship is a contact sport. All the cognitive policies identified involve individuals

interacting to build entrepreneurial intentions within target groups. From a policy perspective, this means that policy strategies need to be developed with a keen understanding of the localized considerations around a specific group, and that policy needs to be implemented at a community level. For private groups, such as The Indus Entrepreneurs (TiE) or the MIT Enterprise Forum, this is more straightforward since they have specific target constituencies that they are working for. The highly successful growth of both of these organizations, reaching global scale through the use of local autonomous chapters, underscores the effectiveness of this strategy.

Policy-makers with broader constituencies, such as regional or national governments, have the opportunity to leverage existing networks and organizations to facilitate change. However, the challenge lies in aligning or overcoming the competing interests of these different groups to the policy-maker's central goal. Higher-level policy-makers should try and limit their policy to broad goals, and assign the task of identifying and implementing policies to local programs. This could be achieved through devolving responsibility to local governments, or through specialized public-private partnerships such as the MIT-Portugal Program, or other appropriate strategies.

### **7.1.3 A self-reinforcing process**

Well executed entrepreneurship policy should be self-reinforcing. The goal is to create meaningful connections, foster economic growth, and provide new opportunities for individuals. There are externalities associated with entrepreneurship that stimulate the need for policy in the first place. However, good policy should aim to build structures that realize their own internal benefit and appreciate the wider benefit of their actions. The entrepreneurial ecosystems that are seen in Silicon Valley, Boston, and in innovative clusters around the world demonstrate that this is possible over the long term.

Since there are externalities associated with entrepreneurship, there will be an ongoing need for policy actions. However, some of the policy options suggested in this paper, in particular networking, have a high up-front cost but with much lower long-term maintenance

requirements since they are self-reinforcing.

#### **7.1.4 Evaluation**

Evaluation metrics for high-level policy makers, which are essential for good governance, should be either be broad enough to encompass the range of policies being implemented, or should be flexible so that local constituencies can set their own metrics. My recommendation is for, in most cases, locally set metrics that are aligned with the specific activities of a given program, as they will be more accurate and the signal will aid a meaningful transfer of authority over a program.

Traditional metrics for entrepreneurship policy include capital raised, companies started, or jobs created. These are important, but they are also only identifiable on relatively long time-frames, compared with political cycles. It is also hard to establish a causal relationship between policies and these broad metrics, given the complexity of any entrepreneurial ecosystem.

One potential metric for more-targeted evaluation is the degree of self-reinforcement of a program offers. Self-reinforcement could be measured through reduced ongoing costs, or spin-out initiatives that have begun from within the community, or other measures. However care should be taken that an evaluation measure doesn't develop into targets which artificially constrain or direct policy making.

Networks, one of the main policy options that stems from the cognitive approach, are hard to measure in terms of their effectiveness. Almost by definition, networking is an indirect, even passive, activity that stimulates entrepreneurial intent, action, and new high-quality businesses over time. But from a policy-maker's perspective, it is important to understand what is functioning well, and what is not, so that resources are not wasted. The growing body of research on ways to monitor and evaluate social networks may aid policy evaluation in this area.

The cognitive approach also provides a unique opportunity for cross-comparable evaluation



through measuring changes in entrepreneurial cognitions. This enables policy-makers to assess the improvements in their target constituency, even if it can't be known with certainty that any changes are all due to their policies. Moreover, with the cognitive approach, trends will likely be identifiable over shorter time periods. Following this up with longitudinal studies and other metrics—such as number of new companies started, or capital raised by target groups—will enable the refinement of the cognitive approach over the longer term.

## **7.2 Considerations**

### **7.2.1 Challenges of networking as a policy option**

Fostering networking is not an easy task in an environment where it is not widely practiced, as in Portugal, or in places such as Pakistan, where networks are based on social groupings rather than professional ones. Bringing together disparate groups, such as faculty from different disciplines, can also present additional challenges if there is not a history of trans-boundary collaboration.

It may be necessary for policy makers to provide some incentives to stimulate networks if resistance is seen. The incentives could be as simple as, within a university context, presenting a series of multi-disciplinary talks, e.g., 'Bio-Tech: The next 10 years for the science and the industry,' with extensive networking breaks sandwiched in between to jumpstart the process. Or they could be more elaborate eye-catching initiatives to kick-start activities, such as entrepreneurial speed-dating for management and science students. Finally, more subtle cues such as prestige can stimulate greater participation. Private groups such as TiE and the MIT Enterprise Forum achieve this through their own brand, and also through Charter Membership that is by invitation only. Generally Charter members are also given additional responsibilities such as mentoring that adds to the overall ecosystem and provides mechanisms for self-reinforcement.

### **7.2.2 Considerations for the use of competitions**

Competitions are a great way to bring together new groups and promote the exchange of new ideas; they also might invite interest from previously un-tapped areas. However, they are expensive and time consuming to run. Moreover, they can be prone to the biases of an implementing agency, rather than being tailored solely to the needs or aspirations of the target entrepreneurs.

Business plan competitions have been shown to enhance entrepreneurial self-efficacy. However, competitions are not always run well. Anecdotal evidence from Portugal, for example, suggests that many of the competitions provide very little feedback and coaching for the participants, and minimal opportunities for networking amongst participants, judges, and other entrepreneurial stakeholders. Opportunities such as these to improve the efficacy of existing competitions should be grasped by policy makers, and decisions to create new competitions should be considered carefully in light of the time, people, and money that are needed to run a high-quality program.

## **8. HOW TO APPLY THE COGNITIVE APPROACH – MIT-PORTUGAL AS A CASE**

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In this chapter, I use the framework developed in Chapter 6 and apply it to the MIT-Portugal Program. Over the course of 10 days in Portugal, I conducted interviews with faculty, entrepreneurs, students and other members of the entrepreneurial ecosystem (for further details are listed in Appendix A).

In this analysis, I apply the cognitive approach qualitatively, to two separate target groups: students and faculty. This work is only preliminary and is meant to illustrate how to use this new approach to develop policy recommendations. The recommendations I have developed do not represent the views or intended actions of the MIT-Portugal Program.

Beyond demonstrating how to use the cognitive approach, this chapter shows how two seemingly similar target groups can have very different needs and different policy actions are required to foster more entrepreneurship in these two groups. This aims to reinforce a key message of this thesis that policies to foster entrepreneurship must be targeted and localized.

### **8.1 Selecting targets**

The MIT Portugal Program has two primary constituents of concern: students and faculty members. So these are the targets of my policy recommendations. Even though PhD students and faculty members can be thought of as similar in many ways—they are based in academic institutions with access to roughly the same resources, and their primary interest and activity is research—the analysis will be done for each target separately to highlight the distinct differences that can occur even with two seemingly similar groups of people.

In the following sections, “students” are the first year Bio-Engineering (BioE) students that are part of the MIT-Portugal Program and who come from the following Portuguese universities: Universidade Técnica de Lisboa / Instituto Superior Técnico; Universidade Nova de Lisboa; and the Universidade do Minho. They are subject to one year of intensive teaching before entering

full-time research for 3 years to complete their PhD. “Faculty,” on the other hand, are faculty at the University of Minho. They could be junior or senior faculty, my research was with mostly bio-engineering faculty.

## **8.2 Students**

I now run through the rest of the steps—cognition assessment, identifying policy actions and policy actors—for the students before repeating the process for faculty in section 8.3. It is worth noting that the MIT-Portugal Program itself may be acting to build entrepreneurial intentions. By being part of the program the students are exposed to a broader range of research, concepts, and people than they would be in another PhD program within Portugal.

### **8.2.1 Assessing entrepreneurial cognitions**

Having identified the target group of 1<sup>st</sup> year BioE PhD students, the next step is to assess the levels of entrepreneurial cognitions present. As well as informal chats with the students, I was able to use their self-reported scores from an assessment as part of the bio-Teams class as well as opinions from, for example, the faculty teaching the course. My initial assessment of the student’s levels of entrepreneurial cognitions is presented below in Table 4.

<b>Cognitive group</b>	<b>Ranking</b>	<b>Explanation</b>
<b>Arrangements</b>	Low	Most students had not been involved with enterprise before and, at this early stage in their training in bio-Teams <sup>8</sup> had not received or internalized enough knowledge to enhance this score.
<b>Abilities and Self-efficacy</b>	Low	Self-reported ranking (MIT-Portugal Program, 2007) and, in conversation, most students expressed the need for further training and exposure before being ready for to consider venture creation.
<b>Entrepreneurial intensity and willingness</b>	Medium-High	Self-reported ranking (MIT-Portugal Program, 2007) but it is also worth considering that, in the primary target group, 1 <sup>st</sup> year PhD students, they have at least another 3 years left to complete their PhD program reducing their propensity to act. However, after that conditions and careers are uncertain.
<b>Perceived desirability</b>	High	Self-reported ranking (MIT-Portugal Program, 2007)

**Table 4: Assessment of entrepreneurial cognitions of BioE students**

### 8.2.2 Identifying policy actions

Having assessed a level for each class of cognitions, in Table 5 I outline the policies most suitable for building the entrepreneurial intentions of the Bio-E students.

Networking, as perhaps expected, is a strong component of the policy actions identified. The next section on actors develops the key constituents for a student’s network. Education also features heavily with a mixture of how-to knowledge, mastery experiences, and case and project-based work required to build out all the cognitions.

It is important to note that policies have been selected with the understanding that this work is targeting first-year PhD students who are in the MIT-Portugal Program. For example, mentoring and a focus on feedback or more individualized opportunities have a lower profile as the students are already committed for the next four years to their program. At a later stage of

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<sup>8</sup> Bio-Teams is an innovation course that runs over the course of the 1 year PhD – it is discussed in much more detail in Chapter 9

their PhD program, it may be more appropriate to target policy towards more individualized support systems such as mentoring programs or business plan competitions as they hone in on specific opportunities, in their research or externally, that they wish to pursue.

Mastery experiences can be built into the educational environment through work on long-term projects such as that already provided by bio-Teams. This is discussed further in the next Chapter.

<b>Cognitive theme</b>	<b>Ranking</b>	<b>Policy actions</b>
<b>Arrangements</b>	Low	<ul style="list-style-type: none"> <li>▪ Educational courses to provide basic how-to knowledge and networking with experienced professionals to more nuanced knowledge</li> <li>▪ Heterogeneous networking and individualized feedback to improve resource access and venture-specific skills</li> </ul>
<b>Abilities and Self-efficacy</b>	Low	<ul style="list-style-type: none"> <li>▪ Case and project-based education to improve skills and provide mastery experiences</li> <li>▪ Heterogeneous networking to improve abilities cognitions.</li> </ul>
<b>Entrepreneurial intensity and willingness</b>	Medium-High	<ul style="list-style-type: none"> <li>▪ Education and networking to (re-)define risk-reward profile of entrepreneurship as a career</li> </ul>
<b>Perceived desirability</b>	High	<ul style="list-style-type: none"> <li>▪ Intervention not necessary as desirability is high</li> </ul>

**Table 5: Identification of elements required for MIT-Portugal Program students**

The challenge with stimulating heterogeneous networking is developing venues that allow for this networking to take place. Some venues already exist such as contests, and conferences. Other options include encouraging interdisciplinary student groups and explicit networking events.

Finally research exchanges, which are already planned through the MIT-Portugal Program, provide an excellent opportunity for networking with new communities of research and entrepreneurship. Explicit efforts should be taken to ensure that students who are visiting MIT engage in MIT’s entrepreneurial ecosystem. This may require guidance for the students as MIT’s entrepreneurial ecosystem is diverse and somewhat fragmented. This guidance is

especially important if exchange visits are short, as the culture of professional networking appears to be limited in Portugal and so students may not be familiar with how to quickly engage in new networks.

### **8.2.3 Identifying policy actors**

The previous section identified the following policies that are necessary for the student population: how-to knowledge, case-based learning, mastery experiences to cement this knowledge through self-efficacy, individualized feedback and heterogeneous networking.

For the policies identified there are a variety of actors that can be used to increase entrepreneurial intentions in the PhD students. In an educational setting, much of the how-to knowledge, mastery experiences, and case-based learning can be easily provided through lectures and courses.

#### ***How-To Knowledge***

Intellectual Property and Patenting is covered in the current bio-Teams Innovation program as is a discussion of the options for various go-to-market strategies. This would be complemented with networking and individualized feedback from external actors such as young entrepreneurs.

#### ***Case-based learning***

Case-based learning provides crucial venture diagnostic skills. Cases should come from both Portuguese and International ventures: International cases expand horizons, but crucially Portuguese cases make work relevant and enhance self-efficacy. If cases are centered on individuals rather than the venture, then additional self-efficacy and possibly networking opportunities arise. Sources for cases, in the case of the MIT-Portugal Program, include: young Portuguese entrepreneurs; seasoned or serial entrepreneurs; the wider-business community.

Young entrepreneurs provide a role model that students can relate to, whereas the businesses of serial entrepreneurs are likely to provide vicarious experiences of more complex and

effective entrepreneurship. Using the wider-business community provides insights into the differences between entrepreneurs from non-entrepreneurs.

### ***Mastery experiences***

Mastery experiences for the students are longer-term projects that are centered on real-world, active (or ongoing) problems. The bio-Teams class uses active research from Portuguese researchers and asks the students to develop go-to-market strategies for the technology. This builds a variety of skills and enhances self-efficacy. However, the fact that the students are heading into a PhD program means that it is almost certain that they will not follow through with the strategy they develop. In my conversations with the bio-Teams students and faculty, it also seems that a number of the researchers who put their projects forward may not pursue these go-to-market strategies either. Instead they were looking for others to do this on their behalf while they remain in research. This makes the projects less compelling as mastery experiences, and moves them towards vicarious experiences – which are also effective – but it seems a waste to not take advantage of a student’s unique position to undertake a mastery experience.

Finding student projects can often be challenging and so expanding the pool of possible projects might be useful. Other projects could come from:

- Portuguese faculty who may not be from a bio-engineering discipline but are actively looking to spin-out their technologies
- MIT faculty from bio-engineering who are actively looking to spin-out their technologies
- Young start-up companies who are perhaps looking to evaluate their technology or products for new opportunities

### ***Individualized feedback***

Individualized feedback for the BioE students could come from a variety of sources and be given in a variety of ways. Feedback could be provided through the existing Bio-Teams class, it could



also be provided through business plan contests and through mentoring. There are a number of business plan contests in universities and nationally throughout Portugal already. Enhancing these contests by working with them to provide rounds of feedback would not only benefit students who participated but also other participants. Mentoring could be provided to students beyond the classroom and beyond the first year of classes. An ongoing relationship with a mentor could help bridge the transition into PhD work and help the students to start thinking about the opportunities within their future research work. Feedback and mentoring should come from those actively involved with or experienced in entrepreneurship.

### ***Heterogeneous networking***

All of the above mentioned actors are important sources for heterogeneous networking. However, other students—those not in the BioE program—are also an important network. They can bring new ideas and new ways of thinking about the same problems. Moreover, they are relatively easy to access. As mentioned in the policy actions section, possible venues for networking include: competitions, conferences, student groups, explicit networking events, and research exchanges with participation in MIT’s entrepreneurial ecosystem.

### **8.2.4 Revising policy actions**

The actors identified in the previous section are: students in other disciplines, recent entrepreneurs, seasoned entrepreneurs, the wider business community, MIT faculty, Portuguese faculty (including from other disciplines), business plan contests, and long-term mentors.

In light of this I would expand and refine the recommended policy actions to the following:

- Promotion of networking, in particular with:
  - Experienced entrepreneurs
  - Young entrepreneurs
- Experience of the MIT Entrepreneurial ecosystem

- Coaching for students on how-to effectively network
- Enhancing the range of projects in bio-Teams to include those close to commercialization
- Creation and support of inter-disciplinary student groups
- Greater range of how-to knowledge provided in conjunction with cases from Portugal and internationally.

## **8.3 Faculty**

Having completed recommendations for the students, this next section repeats the analysis for the students.

### **8.3.1 Assessing entrepreneurial cognitions**

Having identified the target group of faculty at the University of Minho, the next step is to assess the levels of entrepreneurial cognitions present. My initial assessment of the faculty's levels of entrepreneurial cognitions are presented below in Table 6 and come from my detailed interviews with a number of faculty involved in entrepreneurial ventures as well as other key stakeholders.

Cognitive group	Ranking	Explanation
<b>Arrangements</b>	Low-Medium	There is an understanding of patents for their research and support provided through TecMinho. <sup>9</sup> However there is little networking and resource access and an academic career does not build venture-specific skills.
<b>Abilities and Self-efficacy</b>	Low-Medium	Although life experience can improve abilities and self-efficacy. Faculty are heavily specialized in their research career and have little exposure to entrepreneurship through that career.
<b>Entrepreneurial intensity and willingness</b>	Low	For faculty in secure public sector jobs in Portugal the propensity to act is extremely low.
<b>Perceived desirability</b>	Low	Most faculty involved in entrepreneurial ventures will remain in academia while their companies continue. Existing commitment to an academic career is cemented and reduces the perceived desirability of entrepreneurial activities which can be seen as a distraction.

**Table 6: Entrepreneurial cognition assessment for faculty at University of Minho**

### 8.3.2 Identifying policy options

I have based my analysis on an assumption that faculty will be attempting to spin-out companies based on the research they are involved with in the university rather than being attracted to ideas outside that environment. Furthermore, I am assuming that faculty will prefer to remain in the academic system participating only part-time with their new start-ups serving on the board of directors or as scientific advisors. This phenomenon common among MIT related ventures and it reflects the aspirations of the Portuguese faculty I met with. These assumptions are also congruent with the goals of the MIT-Portugal Program to strengthen science and technology in Portugal through strengthening the higher-education system.

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<sup>9</sup> TecMinho provides technology licensing support for faculty.

In contrast with students, faculty are generally in a position where, at any time, they could begin a start-up or commercialization of technology. And so the policy options reflect this by choosing more active and personalized options that will emphasize the opportunities within their current work. This will need idea spotters and other explicit ways of drawing out the opportunities such as targeted competitions. Skill building combined with self-efficacy is fostered through promoting much higher degrees of mentoring as well as high degrees of networking to build vicarious experiences as well as the cognitions of resource access, ability-opportunity, situational knowledge, and idea protection.

Table 7 lists the policy actions identified for building entrepreneurial cognitions in faculty.

<b>Cognitive theme</b>	<b>Ranking</b>	<b>Policy actions</b>
<b>Arrangements</b>	Low-Medium	<ul style="list-style-type: none"> <li>• Training courses for how-to knowledge</li> <li>• Networking for resource access</li> <li>• Feedback and mentoring for venture-specific skills</li> </ul>
<b>Abilities and Self-efficacy</b>	Low-Medium	<ul style="list-style-type: none"> <li>• Training courses for how-to knowledge</li> <li>• Networking and inter-disciplinary research collaborations for abilities cognitions</li> <li>• Bring in idea spotters to enhance opportunity identification</li> <li>• Focus on vicarious experiences</li> </ul>
<b>Entrepreneurial intensity and willingness</b>	Low	<ul style="list-style-type: none"> <li>• Inter-disciplinary research collaborations</li> <li>• Feedback and mentoring</li> </ul>
<b>Perceived desirability</b>	Low	<ul style="list-style-type: none"> <li>• Role models within fellow colleagues at Minho, and research competitions focused on commercialization potential to show advantages</li> </ul>

**Table 7: Identification of elements required for MIT-Portugal Program faculty**

### **8.3.3 Identifying policy actors**

The analysis from the previous section identified the following actions that could be used to build entrepreneurial intentions in Minho faculty: Networking, inter-disciplinary research collaborations, training courses, feedback and mentoring, idea spotters, role models, and competitions.

#### ***Heterogeneous Networking***

Potential investors should be brought into the ecosystem as part of networking, feedback, and mentoring. This reflects the fact that Portuguese faculty should be more ready to deal with investors as their ongoing research may have commercial applications. This also serves as an opportunity to educate investors. Anecdotally, I learnt that many investors were not well versed in high-technology or knowledge based start-ups, although there is a lot of interest in the sector.

However, as investors are not part of our policy target this is simply a spill-over benefit. To put another way, I want to avoid this analysis leading to a policy recommendation that education is required for investors to enable them to better identify promising technologies. Investors do not start companies – they invest in them – by focusing policy towards our targets we ensure that we develop a pool of potential entrepreneurs equipped with the skills and beliefs required to pursue opportunities. Faculty will always understand their technology better than an outsider who cannot be a specialist in everything and so providing the faculty with the tools and outward vision to assess the market is key to fostering more entrepreneurship.

Idea-spotters are also a crucial part of the faculty's network. They could also facilitate mentoring and feedback. Ideas spotters are able to help see the broader picture where others can't and thereby can stimulate and initiate the drive to seek feedback and mentoring. Idea Spotters could be anyone of the policy actors identified and should be integrated into the ecosystem through networking and frequent contact with all parts of the ecosystem.

### ***Interdisciplinary research collaborations***

Linkages with industry are explicitly cited by the MIT-Portugal Program as an important part of their efforts. However, I believe it is necessary to build stronger personal connections and increase the likelihood of serendipitous events that provide novel collaborations and new opportunities. This would not only be beneficial to industry but would provide faculty with a broader range of experiences.

Strong research collaborations already exist in the Program. An ongoing emphasis on research exchanges with faculty, students, and industry engineers moving to host venues to undertake research will enhance entrepreneurial intentions. This is a costly option, but also a worthwhile option. Consideration should be given if it is possible to expand these research exchanges in a cost-effective manner that also furthers the broader goals of the Portugal Program.

### ***Feedback and mentoring***

The assumption is that faculty will mostly be focused on building entrepreneurial ventures based on their research. This provides an opportunity for faculty to self-identify themselves or for idea spotters to pick out promising research and begin discussion with faculty. At this point, individualized feedback and mentoring becomes crucial. Mentoring, in particular, is a long-term process which requires trust to be built with the mentor and mentee and explorations of commercial potential can take place over a lengthy period of time as the technology or research develops.

I believe the MIT's Venture Mentoring Service (VMS) could be useful here. Not currently engaged in the MIT-Portugal Program, VMS has a large pool of talented and experienced entrepreneurs and executives who are committed to fostering new ventures and developing new talent. The entrepreneurship around MIT was, from my experience, widely revered and so there is an opportunity to use them as a catalyst to foster a stronger culture of mentoring in Portugal. Pairing existing entrepreneurs up with VMS mentors provides them with added value, and they could be the primary contact with faculty which allows more culturally relevant

communication to the faculty members. This could provide explicit value and opportunities for existing entrepreneurs, a wealth of experience for our target groups, and help form connections between Portuguese entrepreneurs and the target group. With time, the hope is that the value of these connections in themselves, as well as exposure to the VMS culture of voluntary mentoring, would stimulate an ongoing culture of mentorship from Portuguese groups.

### ***Conferences and competitions***

Regarding conferences and competitions there are many events happening already. All the entrepreneurs I met in Portugal had participated in business plan or innovation contests. However, these competitions provided little or no feedback to the contestants with the exception of winners or, in the case of BioTempo, as a prize. MIT Portugal could potentially boost its own profile and add value to these existing events with significantly less resources than it would take to start their own competition. This would benefit those outside the Program, but as the program is supported through public funding this may be acceptable to the program sponsors.

TecMinho supports technology licensing, industry collaborations, and spin-off support for the University of Minho. They already hold an annual innovation showcase to promote industry-academic connections, which has competitive entry to participate. Continuing to promote and add-value to these events for example by sponsoring high profile speakers will help encourage the exchange of new ideas and the building of new networks.

## **8.4 Summary of policy recommendations for the MIT-Portugal Program**

My analysis has identified a variety of actors for entrepreneurial cognitions that need to be part of the MIT-Portugal entrepreneurship ecosystem. These are:

- Students in other disciplines

- Recent entrepreneurs
- Seasoned entrepreneurs
- Business community
- MIT Faculty
- Portuguese Faculty
- Faculty in other disciplines
- Investors
- Idea spotters

Of these, a number are already within the purview of the MIT-Portugal program, others need to be pursued and engaged. Outside the Bio-Engineering program there are four other programs areas within the MIT-Portugal Program. To engage students in other disciplines, initiating and fostering closer links between the existing MIT-Portugal Program focus areas is an obvious and minimal effort place to start.

Beyond this, particularly for entrepreneurship activities, I believe it is also important to engage with business schools and departments of management within Portuguese universities to help foster more direct understandings of business considerations and stimulate not just technological innovation but business innovations.

For the policy actions, there were a number of similar activities although they often had a different focus. This means that policies can work together as long as explicit attention is given to the needs for individual groups. For example, when hosting an innovation showcase, students could make poster presentations while faculty make presentations to a wider audience. Student posters could be judged by a team of young entrepreneurs promoting connections and initial feedback from role models. At the end of the day, an invitation-only event could be hosted for the young entrepreneur judges, investors and faculty providing new connections, networking opportunities, and that magic combination of entrepreneur, exciting new research and investor all in a room at the same time.



## 9. ENTREPRENEURSHIP EDUCATION AND EXPORTING I-TEAMS TO PORTUGAL

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### 9.1 A cognitive approach to the Entrepreneurship Education

In many ways it is a tautology to take a cognitive approach to education as education is a cognitive process. However, this chapter looks at the evidence on how entrepreneurship education can improve the entrepreneurial intentions. I then describe the i-Teams course run at MIT by the Deshpande Center for Technological Innovation and discuss, given my recommendations from Chapter 8 for the MIT-Portugal program, I examine the current efforts to export this class to Portugal.

### 9.2 Literature on entrepreneurial education

Participation in entrepreneurial education made students perceive entrepreneurship as more desirable and feasible (Peterman & Kennedy 2003), and other studies have also found that entrepreneurship education encourages entrepreneurial tendencies (O'Connor & Ramos, 2006). Specifically, problem-based learning enhances students' entrepreneurial thinking to a remarkable degree, sometimes changing knowledge structures in just a few months (Krueger, 2001)

Krueger, who developed the intentions model, provides an overview of relevant literature describing the role of entrepreneurship education in developing entrepreneurial intentions (Krueger, 2007). He discusses two basic fundamental models of learning: the traditional model of behavioral learning, in which people acquire information, and the constructivist model, in which people acquire skills through which they "learn how to learn." Krueger (2007) notes that "entrepreneurship education has long owed its success to implicitly following the constructivist model." In his discussion, he argues strongly for this model, stating: "if one wishes to change deeper cognitive structures such as scripts, then it is imperative to focus on teaching methods

that focus on knowledge structure, not just knowledge content.”

This implies that entrepreneurial pedagogy should teach not only how to answer questions—such as in diagnosing a business case—but also how to form the questions in the first place (Krueger, 2007). Krueger (2008) cites Monroy as the first to articulate that, in creating more and better entrepreneurs, traditional classroom methods are not as effective as experiential learning. Fittingly, the most popular and effective entrepreneurship teaching methods are constructivist, such as case-studies, business plan development and shadowing entrepreneurs (Krueger, 2008). According to Krueger (2008), the most well-known constructivist technique is action learning, in which a person studies their own actions and experience in order to improve their performance. Krueger (2008) concludes his discussion of the theory behind entrepreneurship education by noting that creating a combination of practical and cognitive skills—the desired output of an entrepreneurship class—requires action learning, which combines, in a synergistic fashion, classroom and hands-on learning. Appendix C contains a series of practical pedagogical steps which can facilitate constructivist teaching.

Finally, we know that experiences build self-efficacy, which is crucial to developing entrepreneurial actions. However, Krueger (2008) highlights that, in a classroom setting, not all exercises that aim to be experiential actually are so. “Truly experiential exercises give careful consideration to process and content—and give students room to make mistakes” (Krueger 2008).

### **9.3 Entrepreneurship education at MIT and i-Teams**

At MIT there are thirty-five classes dedicated to educating students in entrepreneurship, of which nineteen were running in parallel in the semester of spring 2008. These classes cover a wide range of topics from entrepreneurial finance and law to strategic decision making in the biomedical business. The majority of classes use case-based teaching and thereby provide vicarious learning opportunities for students. More significantly, six of these classes focus on

providing mastery experiences. These mastery experiences cover the gamut of the entrepreneurial life-cycle from engaging with established or growing companies in G-Lab and E-Lab, to developing student business plans in New Enterprises.

In 2004, the Deshpande Center for Technological Innovation launched a new class, i-Teams, to help fill an often overlooked area of high-technology entrepreneurship. The focus of the class is on identifying whether a technology that is still “in the lab” is suitable for commercialization, and if so, what is the go-to-market strategy. The purpose of the class is not to write a full business plan, as other classes already cover that, but to identify whether a technology is in-fact a commercial opportunity, and then the broad brush strokes of what form a business based on that technology might be. As Ken Zolot the instructor and founder of the class puts it, there are four broad possible outcomes of the class that students can report back to the principal investigators (PIs) – 1) start-up a company 2) license the technology 3) keep it in the lab or 4) your baby’s ugly (Zolot, personal communications, September 7, 2006). The ‘your baby’s ugly’ is more diplomatically described as “a well-researched conclusion that there is no readily apparent use for the technology.” (Zolot, 2006)

In the initial incarnation, all the technologies were selected from the pool of technologies that had been funded by the Deshpande Center. As part of the Deshpande Center funding, PIs are assigned a Catalyst – an experienced entrepreneur or business mentor who provides the PI with insights and feedback on commercialization opportunities and guides them through the process if necessary. This Catalyst program is independent of the i-Teams program. However, i-Teams students also have access to the project’s Catalyst and so are provided with external and highly individualized feedback that enhances the class.

The format of the i-Teams embraces most of the pedagogical principles laid out by Krueger (2008) to enhance entrepreneurial intentions. The class brings together teams of graduate students from both the engineering and business schools at MIT and teams are formed by the instructors to ensure a diversity of skills and experiences. The students are given key tasks of: evaluating the technology’s status, understanding the intellectual property, creating an

overview of an appropriate business model, and considering the competition and recommendations for next steps. Although this may seem structured, the task quickly becomes unstructured as most of the technologies used by i-Teams have a myriad of possible applications and even the status of the technology is sometimes hard to assess making all subsequent tasks a feat of ingenuity. And this quite accurately reflects a real-world situation: the steps of creating a new venture are well known and understood. However, the devil is in the details and this class provides students with not only skills but an opportunity to obtain a degree of mastery of those skills.

Other entrepreneurial skills and experiences are also brought into the class. One class is devoted to attending a networking event and students are assigned to “have good conversations.” Another class takes place at a Venture Capital Conference where students not only present their work and the technology but also are encouraged to interact with the attendees and form new connections.

## **9.4 Taking i-Teams to Portugal**

### **9.4.1 Bio-Engineering Innovation Module and bio-Teams**

As part of the MIT-Portugal Program, i-Teams was adapted and included in the Bio-Engineering Doctoral program as a ten day innovation module and ongoing class entitled bio-Teams. The selection of i-Teams, as opposed to other MIT Entrepreneurship courses is congruent with the fact that the MIT-Portugal Program is primarily concerned with strengthening research science and technology and it has a relatively young entrepreneurial ecosystem.

Not only does i-Teams fits well with the existing infrastructure, it also offers something completely new for Portuguese students. Redford (2006) surveyed the state of Portuguese entrepreneurial education in 2004/5 and found that entrepreneurship education was relatively young in the country, although there was a lot of interest around it, and that “pedagogy was

largely focused on business plan creation and theoretical lectures.”

At the start of the academic year, the students went through an intensive ten day innovation module designed to prime the students for the bio-Teams project which would provide a real-world opportunity to develop these new skills. Dr. Perez-Breva, a former i-Teams student and entrepreneur, provided the bulk of teaching from the MIT team. A survey was administered before and after the module to assess the student’s baseline and changed entrepreneurial skills and intent (MIT-Portugal Program, 2007). In entrepreneurial intent, no statistically significant change was seen, although there was a slight increase. However significant differences were reported in a range of entrepreneurial abilities that were targeted by the module, including the ability to: “grasp the concept and limits of a technology well enough to see the best ways to use it;” “recognize when an idea is good enough to support a major business venture;” and “pick the right marketing approach for the introduction of a new kind of service.” The survey also found that students had a very low level of knowledge of sources of support for entrepreneurs.

The bio-Teams class began, for the first time, at the end of January 2008, some 4 months after the innovation module had taken place. Having briefly met the students at the mid-way point in their project (21<sup>st</sup> April 2008), my impression was that they seemed somewhat bewildered by the task and many were concerned about the intellectual property considerations for their technology. From my experiences with the i-Teams class at MIT, this is roughly how the students should be feeling at this stage, and I am confident that they will surprise themselves as they pull together a strategy for the researchers who own the technology they are assessing.

It will be interesting to see how the student’s entrepreneurial intentions and reported abilities have changed again upon completion of this bio-Teams module.

#### **9.4.2 Innovation module in EDAM Program**

The MIT-Portugal Program in Engineering Design and Advanced Manufacturing (EDAM) is also running a spring course on innovation structured around the i-Teams concept and taught by Dr.

Perez-Breva. However the curriculum and contact time has been shortened further – a five-day workshop with a pre-assignment to assess the technology and one month after the workshop to write-up a go-to-market strategy.

In this case technologies were taken from the EDAM research groups and were largely assigned on an individual basis with only one team containing two people. Students were also given the option to work on their own project if they had one.

Following my previous policy recommendation to foster linkages between different groups of students, I recommend that MIT-Portugal try and find at least a partial way to co-ordinate these programs. This could not only potentially save on resources but could also provide the opportunity for students to interact with different disciplines and backgrounds. Half the EDAM students are professionals on a one-year program to train technical managers. This difference could alter the team dynamics and level of mastery experience significantly as it provides the possibility that some team members might pursue the strategy outlined by the team after the class has finished. In i-Teams students regularly go on with PIs to form business plan competition teams and some have spun-out companies as a direct result of participation in i-Teams.

## **9.5 Recommendations for the innovation component of Bio-E Program**

The ten-day innovation module included a number of case-based projects and a variety of guest speakers which, I believe, will have enhanced the students learning from a purely taught syllabus. I would like to recommend one addition to the innovation module syllabus and that is an overview of the complete life-cycle of start-ups. The students are coming with fairly low-levels of entrepreneurial exposure and a business culture that does not celebrate the closure of companies as a natural part of the business cycle, and discussion of this and thoughts on what the next steps are for an individual could be useful.

There have been number of changes made to the i-Teams format during its export to Portugal

as bio-Teams. I would like to highlight some aspects of the i-Teams program that I recommend be brought into the bio-Teams class for next year:

- All the students are from within the Bio-E program leading to teams with very similar backgrounds. Bringing in the EDAM students and also students from management schools in Portugal I believe would greatly enhance the exercise and would greatly strengthen the entrepreneurial cognitions of the Bio-E students.
- Projects were selected from applications to bio-Teams directly, meaning that they do not come with a Catalyst to serve as a business mentor. This is a very valuable aspect of the i-Teams process and finding ways to facilitate outside mentoring would be very valuable to the students and would, I believe, enhance the output for the researchers.
- The networking for credit element was not included in the bio-Teams syllabus and students are not given an opportunity to present their work at a venue that is outside the bio-Teams environment – such as the VC Conference in i-Teams. The addition of these elements would, again, enhance the mastery level of the project by making it a more real-world and personalized experience.





## 10. CONCLUSIONS

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The goal of this thesis was to motivate policy-makers to re-think entrepreneurship policy from the perspective of the entrepreneur. I hope I have achieved this in four distinct ways:

1. By highlighting some of the recent literature on entrepreneurship policy and its effectiveness.
2. By developing an evidence-based methodology based stemming from the cognitive science's findings on entrepreneurial intentions and thinking.
3. By applying this methodology to the specific case of the MIT-Portugal program, showing that it is feasible to identify policy options using my approach.
4. By showing that the policy options that derive from this approach are different from commonly used policies

This thesis began with a quote from Paul Reynolds of the Global Entrepreneurship Monitor, noting that "businesses are started when somebody wakes up in the morning and says 'maybe I'll start a business today'." In the discussion of the cognitive aspects of entrepreneurship in Chapter 4, it became clear that, long before that "eureka" moment, knowledge and experiences have shaped that individual, and the seeds of entrepreneurship have been planted. Then when a displacement occurs or an opportunity arises does this catapult the individual on her entrepreneurial trajectory.

If policy-makers wish to stimulate more and better entrepreneurship, then policy must act earlier, to plant those seeds through developing individuals' entrepreneurial cognitions. This is contrary to traditional entrepreneurship policy, which has been mostly targeted at smoothing the path for the entrepreneur once they have chosen to start a venture. This focus stems from the fact that typically entrepreneurship policy has been added on to Small and Medium-sized Enterprise (SME) policy, rather than being considered on its own. But entrepreneurship policy, as opposed to SME policy, requires a focus on individuals, and fostering more entrepreneurship requires a focus on those individuals who may not even yet have entrepreneurial aspirations.

These people may not self-select themselves for policy-initiated programs, so instead policy-makers must reach out to those they wish to encourage.

In Chapter 5, I identified a series of policy options that could be used to stimulate an entrepreneurial ecosystem and foster entrepreneurial cognitions. I presented conventional options, such as educational courses and research exchanges, and some unconventional options, such as the use of television shows to enhance venture diagnostic abilities and the use of placements abroad to provide positive displacements that could stimulate the career change towards entrepreneurship. I hope that policy-makers, who understand their circumstances and their constituents best, will see this as an opportunity to experiment, be creative, and to leverage untapped resources.

This range of possible policies illustrates two major themes of this thesis:

1. The current policy approaches often do not get to the root of entrepreneurial intentions; and
2. Entrepreneurship, and fostering entrepreneurship, is about individuals, so policies must target individuals with their own unique experiences and needs.

In applying my cognitive framework to the case of the MIT-Portugal Program, as I did in Chapters 8 and 9, it was relatively easy to focus on the individual target groups. However, for national or federal governments, the implication of my analysis is that entrepreneurship policy must be localized, either through devolution to lower levels of government or through the targeting of specific niche populations.

This approach to entrepreneurship policy—which brings together cognitive science and policy—has, to my knowledge, never been done before. I have brought a new perspective and a pragmatic tool that can aid policy-makers in the difficult decisions they need to make when considering how to foster entrepreneurship.

The next step for this research is to rigorously apply the framework and undertake longitudinal

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studies with policy experiments to quantify the effectiveness of this approach. As the literature on entrepreneurial cognitions and entrepreneurship policy are growing fast, I hope that the two disciplines will build on this first attempt to put the entrepreneur at the heart of entrepreneurship policy.



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## **Appendix A – List of interviews conducted**

### **Pakistan –August, 2007**

- Aslam, Jawad – Project Manager, Saiban (Lahore)
- Azim, Kamran – Chief Operations Officer, Kashf Foundation (Lahore)
- Ansari, Humayun –Faculty, Marketing, Institute of Business Administration (Karachi)
- Danishmand – Dean and Director, Institute of Business Administration (Karachi)
- Pakistan Initiative for Strategic Development and Competitiveness (Lahore)
- Rizvi, Azhar – Founder, THK Solutions (Karachi)
- Salman, Ali – CEO, PaniGhar (Lahore)
- Sethi, Bilal – J E Austin Associates (Islamabad, by phone)
- Siddiqui, Faizan - Founder, Enterprise Consulting and Advisory Services (Karachi)
- Siddiqui, Tasneem – Founder, Saiban (Karachi)
- Syed, Umar – CEO, AKN-MTech (Karachi)
- ul Islam, Faheem – Assistant Professor, Lahore University of Management Sciences (Lahore)

### **Portugal – April, 2008**

- Alves, Madalena – Founder, Ambisys (Braga)
- Amorim, Ana Paula – Department Head, TecMinho (Guimarães)
- BioE MIT-Portugal students, informal conversations (Braga)
- Duque, Duarte – Chief Technology Officer, Exva (AvePark, Guimarães)
- EDAM MIT-Portugal students, Focus group at University of Porto (Porto)
- Faria, Nuno – CEO, BioTempo (Braga)
- Faro, Carlos – Scientific Director, Biocant (BioCant, Coimbra)
- Ferreira, Frederico – CEO, Exva (AvePark, Guimarães)
- Ferreira, Lino – Research Director, BioCant (BioCant, Coimbra)
- Gomes, Andre – Founder, Crio Esteminal (BioCant, Coimbra)
- Martins, Maria João – Founder, Ambisys / Founder, BioTempo (Braga)
- Pinto, Avelino – Director, SpinValor
- Rocha, Isabel – Founder, BioTempo / Assistant Professor in Bioprocess Engineering, University of Minho / Organizer Bio-Teams and IdeaSpring (Braga)
- Sousa, Rui – Founder, StemMatters (Braga)

## Appendix B – Entrepreneurship policy options

The comments in the third column are taken from Audretsch et al. (2002). A number of the opinions expressed here do not reflect my own beliefs on the mechanisms of entrepreneurship policy from my reading of the literature, but they do present one side of the argument. Broadly speaking, it could be said that this reflects a more economics-centric view of the role of policy.

Policy Area	Specific Policy Options	Notes and Comments (from Audretsch et al.)
<b>Macro</b>	Taxation	OECD argues high tax rates reduce returns on entrepreneurship and can induce avoidance on the flip side self employment offers better opportunities for tax avoidance (Parker 1996); different types of taxes are important – tax on dividends vs tax on capital
	Labor market regulation	Small business have difficulty hiring skilled personnel. Flexibility is important.  Unionization increases difficulties for employers but provides safeguards for employees.  According to the OECD, deregulation of labor markets has been shown to stimulate entrepreneurial activity
	Social security	If you have to give up benefits when you leave a large corporation that's a risk.  High levels of social benefits discourage unemployed from starting company.  Inadequacy of safety nets for entrepreneur very relevant in early phase of business.
	Income policy and income disparity	Wage moderation can stimulate entrepreneurship by lowering costs of hiring labor.  Labor income share in national income has negative influence on business ownership in 23 countries.  Income disparity can create indirect incentives for self-employment.
<b>Regulation of dynamism</b>	Establishment legislation	Can be a serious barrier for potential entrepreneurs as raises costs of starting a business.  Distinction between amount of cash and amount of time.  Conceivable that requirements contribute to higher quality – evidence is scarce.

Policy Area	Specific Policy Options	Notes and Comments (from Audretsch et al.)
	Bankruptcy policy	<p>Allows resources to move to most productive uses.</p> <p>Restriction of scope for closure restricts entrepreneurial activity.</p> <p>Need to strike a balance between creditors and enterprise's needs.</p> <p>Also has a stigma effect – good try vs personal failure. Need to stimulate public attitude towards business failure</p>
	Deregulation and simplification	Stimulating free markets and lifting administrative burdens
	De-regulation and competition policy	<p>De-regulation removes regulatory barriers. This is often accompanied by privatization.</p> <p>Competition policy removes market barriers such as cartel agreements.</p>
	Administrative burden and the cost of compliance	<p>Time and energy required distract entrepreneurs from day-to-day commitments</p> <p>Cumbersome administrative procedures could discourage potential entrepreneurs</p>
<b>Input related policies</b>	Functioning of Venture Capital markets	<p>Venture capital is particularly important for financing high-risk, high-return projects</p> <p>Well developed markets are assumed to stimulate high risk, high return entrepreneurship</p> <p>Governments can get involved directly through government venture capital schemes; or indirectly through incentivizing private venture capital</p>
	Specific entrepreneurship support policies	<p>Policies to support small businesses – such as fiscal facilities, tax exemptions, subsidized courses and information</p> <p>Networks of entrepreneurs can stimulate exchange of information.</p> <p>Adequate evaluation is often rare. Effectiveness should be monitored.</p>
<b>Sector specific problems</b>	Stimulating amongst groups of people	<p>Target youth entrepreneurship: evidence shows the likelihood of self-employment increases with age; young people have less available capital</p> <p>Target women, as they are less included than men in entrepreneurial activities and tend to engage in different activities</p>
	Stimulating in geographical areas	Target under-developed or under-performing rural areas but many rural areas don't want to industrialize and so planning issues can be a concern

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Policy Area	Specific Policy Options	Notes and Comments (from Audretsch et al.)
	Stimulating R&D and high-tech firms	<p>There are strong government justifications for investment in this area due to significant market failures from high expense and risk of inappropriateness of investment</p> <p>Inappropriateness of investments can be reduced through a good patent system</p>
<b>Education</b>	Influence entrepreneurship through education system	<p>Need to think through both the quality and type of education</p> <p>Primary, secondary and tertiary must be distinguished.</p> <p>Evidence that higher investment in tertiary education increases rate of firm formation</p> <p>Education provides autonomy and self-confidence</p> <p>Makes people aware of alternative career choices</p> <p>Broadens horizons of individuals making opportunity perception better</p> <p>Provides knowledge for identifying and executing entrepreneurial opportunities</p> <p>Difference between entrepreneurship specific education and generally improving education which will also have an impact</p> <p>Can use education system to raise awareness and standing of entrepreneurs</p> <p>There is debate that entrepreneurial qualities can be taught</p>

## Appendix C – Actions for constructivist learning

Brooks and Brooks' (1993) twelve concrete to operationalize constructivist learning principles (taken from Krueger, 2008):

1. Explicitly encourage, accept, and honor students' autonomy and initiative.
  - Self-managed, self-organized TEAMS work teams require that students take considerable initiative.
2. Try to use raw data and primary sources as fodder for student inquiry.
  - Requiring student initiative and responsibility also requires that the instructor give them the authority to guide the direction of TEAMS projects after launching.
3. Students' tasks are to classify, analyze, predict, and create (not simply memorize).
  - The real world projects inevitably involve both primary and secondary data collection as grist for the students' mill.
4. Student responses on a topic should direct strategy and content of teaching
  - The projects (and the essay exam) force the students to think critically, to integrate and apply what they are learning with the projects (and with past life, work and school experiences).
5. Ask for students' understanding before we give them our perspective.
  - They also require that class discussions be centered around the student's authentic questions, often about how to apply a concept to their project.
6. Encourage dialogues between students and teacher, each other, family, even outsiders.
  - The projects require students discuss their efforts with each other and to clients and others in the community with knowledge and expertise needed for the project.
7. Ask open-ended questions; encourage students to also do so.
  - The exam takes this approach, while the projects themselves naturally induce open-ended questions (often to a harrowing degree). Moreover, students feel free to ask tough questions of each other.
8. Ask for elaborations of initial responses.
  - Similarly, students rarely let their peer give evasive answers (but are coached to be supportive as well.)
9. Don't accept quick answers; encourage reflection.
  - Similarly, giving the students two months for the essay exam affords them an opportunity to elaborate and reflect, even argue with one another.
10. Actively seek contradictions.
  - Interestingly, the projects appear to encourage the students increasingly toward initiating dialogues that are more Socratic in nature, as they struggle to make sense of ill-structured projects in ill-structured domains.
11. Actively seek metaphors.
  - Metaphorical reasoning is not inherent in these projects (nor the exam) although students have a propensity toward analogical reasoning, even where spurious, affording teaching moments for the instructor.
12. Take advantage of the natural learning cycle (from discovery to concept introduction to application), balancing both challenge and safety.
  - The extended time afforded the exam allows students to work through this cycle. The projects are extremely challenging but students also realize there is a safety net in the form of both the instructor and their fellow students.