

Embedding entrepreneurial regional innovation ecosystems: reflecting on the role of effectual entrepreneurial discovery processes

L. Nieth^{a,b}, P. Benneworth^{a,c}, D. Charles^d, L. Fonseca^e, C. Rodrigues^e, M. Salomaa^f and M. Stienstra^a

^aCenter for Higher Education Policy Studies, University of Twente, Enschede, The Netherlands;

^bRegio Twente, Enschede, The Netherlands;

^cNORCE, Kristiansand, Norway;

^dNewcastle Business School, Northumbria University, Newcastle upon Tyne, UK;

^eDepartment of Social, Political and Territorial Sciences, University of Aveiro, Aveiro, Portugal;

^fLincoln International Business School, University of Lincoln, Lincoln, UK

ABSTRACT

Collaboration between regional stakeholders is increasingly emphasized in innovation policy as a way to activate the inherent agency in a regional innovation system. Partnerships of diverse stakeholders have been identified as critical, being able to envisage and implement future pathways that in turn bring change to a region. Thus, the knowledge of various stakeholders is supposed to be combined in novel ways in order to define regional assets and possible future pathways. Nevertheless, it has been recognized that these agency activation approaches often fail to realize these long-term visions initially agreed by partners. We here draw on Sotarauta's notion of policy 'black holes', where regional partners repeat past superficial successes rather than driving in to systemic change. We seek to understand the conditions under which regional stakeholders can build realistic and adaptable strategies that shift regional development trajectories. We explore this via a qualitative approach comparing entrepreneurial discovery processes in three peripheral regions, namely Twente (Netherlands), Aveiro (Portugal) and Lincolnshire (UK). We reflect on the potential value of more effectual (opportunistic/ flexible) approaches to entrepreneurial discovery. We argue that black hole problems may arise from the way agency activation strategies conceptualize long-term strategy development, if partners' mind-sets are too causal and lacking flexibility to continually reorient strategies during implementation better towards these collective visions.

KEYWORDS: Entrepreneurial discovery; agency activation; partnerships; causal and effectual approaches

JEL: O20; O30; R58

Introduction and problem setting

The encouragement of collaboration between regional stakeholders is increasingly emphasized in innovation policy as a way to activate the inherent agency in a regional innovation system (Grillitisch & Sotarauta, 2018). Partnerships of diverse stakeholders have been identified in a range of different literatures as critical, being able to envisage and implement future pathways that in turn bring change to a region (Cooke, 2005). This phenomenon of stakeholder partnerships is variously referred to as regional innovation networks (Rodrigues & Teles, 2017), regional innovation coalitions (Benneworth, 2007), or multi-level partnerships (Morgan & Nauwelaers, 2003). Related to these theories are a set of corresponding policy prescriptions – such as smart specialization or constructed regional advantage – that seek to identify desirable future opportunities and reorient regional activities using policy interventions that build towards these desirable futures. But there is a problem in that ‘local knowledge which is dispersed, decentralized and divided’ (Foray, 2016, p. 1433). These agency activation approaches expect actors to come together in coalitions and combine their dispersed knowledge to identify and implement promising micro-level solutions, which then affect macro-level regional development paths.

This special issue is intimately concerned with how regional innovation strategies can achieve embedded change and ensure material changes that stimulate innovation-based territorial growth. We identify that one of the kinds of knowledge that may be missing in regional strategic processes is the architecture of embeddedness – existing connections between partners that can facilitate knowledge exchange and allow spill-over effects to emerge. A risk here is that regional strategies underplay the importance of these embeddedness architectures, promoting instead superficial strategic connections, with partners falling into what Sotarauta (2016) terms a metaphorical ‘black hole’. In such situations, subsequent policy cycles may merely repeat earlier shallow successes, rather than embed those successes into more systemic change. A substantive challenge in using these agency activation theories is in understanding the conditions under which regional stakeholders can, through a process of constructive dialogue, build realistic and adaptable strategies that are then implemented to shift regional development trajectories. Likewise, developing regional innovation strategies that help embed activities to create effective entrepreneurial regional innovation systems requires addressing this ‘black hole’ problem. We therefore argue that this issue may arise from a lack of regional capacity to build upon existing embeddedness, something that we frame as being a tendency towards causal rather than effectual reasoning by regional strategic partners (see Nieth & Benneworth, 2018). The overall research question we pose is: ‘are effectual approaches to regional innovation strategy a way to encourage the development of regional embeddedness?’.

We begin by examining the interplay of agency activation approaches and the issue of regional embeddedness, here conceptualized in terms of the topology of existing regional connections that facilitate knowledge spill-over, and how attempts to strategically manage new sectoral strengths can exploit these regional connections. Noting a tendency in these regional stakeholder partnerships to seek to create new industries rather than genuinely new combinations exploiting existing embeddedness (Hospers, 2006), we argue that this is potentially a consequence of a dominance of causal reasoning processes over effectual approaches in regional strategic processes. Focusing specifically on one of these agency activation approaches, namely smart specialization, we reflect on whether there are also the possibilities for more effectual (opportunistic/flexible) approaches to entrepreneurial discovery. To answer our question, we use a qualitative case study approach comparing entrepreneurial discovery processes in three peripheral regions, namely Aveiro (Portugal), Twente (Netherlands) and Lincolnshire (UK), drawing on interviews with key stakeholders as well as analysis of process reports and policy documents. We highlight that there are three main kinds of effectual reasoning repertoire that emerge, using strategies as pathways, creating new flexible

organizations and retaining institutional entrepreneurs even where they move to other jobs in a region. On this basis, we argue that there is a prima facie case for a more comprehensive inclusion of reasoning approaches within regional innovation strategies (RIS) literature, as well as to work to remove more causal thinking approaches from policy-prescriptions.

Towards a theory of effectual entrepreneurial discovery

In the last ten years there has been increasing interest in building understanding of how regions can use policy interventions to create new economic development trajectories and pathways; in this article we focus specifically on the case of smart specialization as a leading agency activation approach. A key mechanism within smart specialization is the 'entrepreneurial discovery process' in which various stakeholders come together to reveal their knowledge and identify potential new knowledge combinations; a 'local concentration and agglomeration of resources and competences in these domains' that might lead to regional competitive advantage (Foray, 2016, p. 1431). Central to entrepreneurial discovery is discovering new fields of opportunity related to existing strengths, networks and capacity, and therefore can be understood as seeking to exploit existing regional embeddedness. Successful strategic management of this process depends on successful input from regional stakeholder partnerships, which may lack the detailed knowledge of the manifold connections and social relations from which new regional advantage can be created (Yoon, Yun, Lee, & Phillips, 2015). We contend that this might potentially drive the use of causal reasoning, and in this paper, we seek to reflect the outlines of a more opportunistic/flexible approach, what we here refer to as effectual entrepreneurial discovery. We therefore propose a framework for distinguishing causal entrepreneurial discovery process behaviours from more effectual as the basis to understand whether effectual behaviours associate more strongly with more successful agency activation strategies.

Evolutionary approaches to regional economic development & the risk of the black hole

Following the evolutionary regional development approach, we regard places as evolving over the long-term along particular trajectories. In this perspective, the fortunes of their dominant industries drive either investment and growth, or disinvestment and shrinkages. Evolutionary economic geography distinguishes four kinds of regional capacity (Isaksen & Jakobsen, 2017):

- path extension (small changes over time within the same industries/technological paths);
- path upgrading (major changes within an existing path, triggered through the use of new technologies or new modes of organization);
- path renewal (new paths as results of the recombination of existing activities and related/unrelated knowledge);
- new path creation (new industries/technological paths for a region can rely on 'imported knowledge' or the results of R&D activities).

These repertoires are sequentially more complex, with path renewal and path creation depending on regional actors able to envision and implement collective change through a process of mutual negotiation, compromise and coordination. In a recent study on path creation in Denmark, it was concluded that the renewal of paths is a result of joint contributions through 'social action by knowledgeable pioneering individuals, universities, companies and/or governments' (Simmie, 2012, p. 769).

Policy-makers seek to influence those developmental trajectories in various kinds of ways, particularly those regions undergoing or at risk of becoming locked into disinvestment-shrinkage, what we here

refer to as sparse regional innovation environments (after Johannisson, 1993). Policy-makers seek to upgrade their regional trajectories through concerted programmes of investment in regional innovation, underpinned by regional innovation strategies (RISs). These strategies seek to strengthen interaction within the regional innovation systems, directing the inflow of ideas and investments, and the outflow of knowledge and productions, both building on existing regional embeddedness but also supporting an extension and upgrading of that embeddedness. The smart specialization policy model contends that regional strategies should be driven by mobilizing regional agents (for path renewal and creation) working together around entrepreneurial discovery processes. These entrepreneurial discovery processes seek to best contribute constructively to regional embeddedness, both drawing on and making use of existing embedded networks but also ensuring that activities drive towards embeddedness.

But whilst appealing in a limited number of best practice examples, in reality, smart specialization and entrepreneurial discovery do not always work smoothly in practice. Although partners may easily agree on the overall final destination (the regional innovation strategy) and a first round of interventions, as the strategy develops, they may resort to repeating those approaches initially adopted in the first strategy round. This is problematic because innovation policy is a learning process, in regions with less tradition of innovation policy, a first round of a strategy may involve simple activities that intend to build capacity between partners, for example by giving every partner some projects in which they learn how to participate in collective activities. The rational step then in subsequent rounds is to exploit these connections to leverage the deeper networks within which the various actors are embedded (for further examples see Sotarauta, 2018). However, if there is no strategic collective knowledge of the networks within which partners are embedded, then this can undermine agreeing on collective developments, diluting investments, with the result that the region does not move forward, but stagnates or back-slides (see Figure 1).

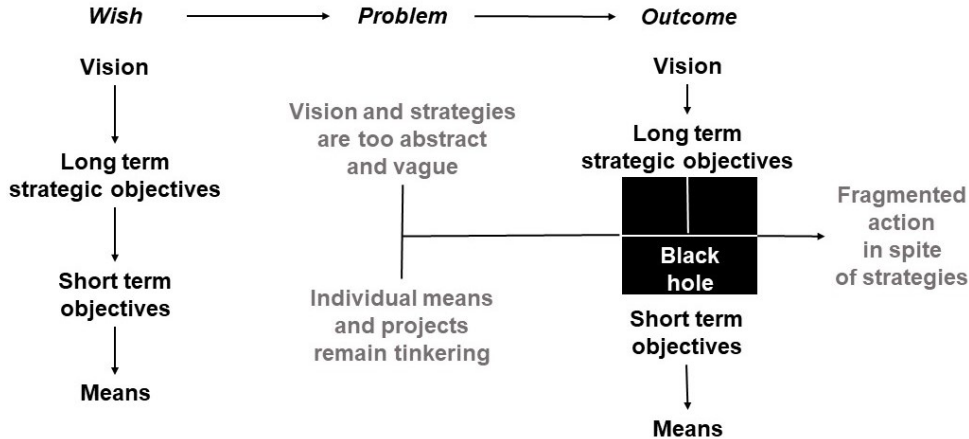


Figure 1. Simplified illustration of the black-hole of classical strategy development. Source: Sotarauta (2004).

Distinguishing causal & effectual approaches to entrepreneurial behaviour

Our diagnosis here is that there is a systematic mismatch between plausible end goals (creating a new regional trajectory) and the immediate choice of strategic options that emerge through the entrepreneurial discovery process. In particular, there is an issue that the long-term vision fails to take

into account the existing networks and structures, and therefore in developing strategies, projects and route-maps neglects existing embeddedness and collective assets in favour of more generally appealing interventions. We can here see that this entrepreneurial discovery process seems to be echoing a more general issue in entrepreneurship, of entrepreneurs trying to create new businesses in the split between causal and effectual mind-sets in the new venture creation process (Sarasvathy, 2001). Sarasvathy argued that a common mistake of starting entrepreneurs was that they identified the desirable endpoint and then set out strategies to get to those end-points. An example here is that technology businesses typically are regarded as requiring venture capital to grow, and therefore starting entrepreneurs are often seen to develop a business plan to acquire venture capital, what Sarasvathy terms causal reasoning. By contrast, more experienced entrepreneurs would realize that they needed to acquire resources to grow the balance sheet and would look around for the most readily available resources given their own personal situations and contacts, an effectual reasoning approach. Causal entrepreneurs typically have great problems and inflexibility in adjusting to circumstance when reality does not follow their causal trajectory to the desired end-state. Conversely effectual entrepreneurs have the flexibility to respond opportunistically by continually reviewing the opportunities and resources they command and then developing iterative strategies that will bring them closer to the desirable end-state.

Her current analytic framework distinguishes causal and effectual approaches in terms of five overarching attitudinal differences which manifest themselves in six categories (see Tables 1 and 2 below). Causal entrepreneurs pick their desired future and seek to realize that, whilst effectual entrepreneurs try to move towards more desirable future end points and away from less desirable future situations. There are a number of different kinds of belief that characterize causal entrepreneurial reasoning (i) the future can be predicted, (ii) goals can be selected and then delivered, (iii) risks are best managed in terms of their expected returns (iv) uncertainties and difficulties should be avoided and (v) success requires being competitive with reference to other partners. Conversely, effectual entrepreneurial reasoning believes (i) the future is at least partly creatable, (ii) the achievability of goals primarily relates to personal resources, (iii) risks are best managed in terms of the expected affordable losses, (iv) uncertainties and difficulties are regarded as inevitable and (v) success requires alliances as well as competition with other companies. The distinctions between causal and effectual reasoning are summarized in the following table:

Table 1. Key distinctions between causal and effectual reasoning in entrepreneurial processes.

Issue	Causation	Effectuation
View of the future: prediction vs control	The future can be predicted based on past experiences; knowledge obtained in the past serves to predict the future. It is necessary and useful to accurately predict the future.	There is no need to predict the future; focus on the extent to which you can control the means available to you. Willful agents pre-commit to the new venture so that markets can be co-created.
Givens: goals vs means	Goals are given. Growth based orientation with a vision of desired ends. Goals determine who to bring on board. Sub-goals come from main goals.	Means are given: who I am (traits, abilities), what I know (personal experience, training, education) whom I know (personal network; family, business school professors).
View of risk and resources: expected returns vs affordable	Expected returns: pursue new opportunities based on risk-adjusted expected value.	Affordable loss: invest what you are willing and able to lose. Small bets to invest in adequate opportunities

loss	Financials such as loans and investments needed to reach the upside potential.	with a focus on limiting downside potential.
Attitude towards unexpected events: avoid contingencies vs embrace contingencies.	Avoid contingencies: take aversive action to avoid obstacles and plan to reduce risk to a minimum.	Embrace contingencies: do not avoid risks, leverage them into new opportunities. Surprise is good for discovering new directions.
Outsiders: competitive behaviour vs partnerships	Competitive behaviour: limit ownership of outsiders. Competitive analysis needed to protect and maximise share of the opportunity.	Partnerships: self-selected stakeholders shape the direction of the new venture. Both parties acknowledge and share rewards and risks.

Source: Authors own elaboration after Dew, Read, Sarasvathy, & Wiltbank, 2009, Read, Dew, Sarasvathy, Song, Wiltbank, 2009, Sarasvathy, 2008, and Sarasvathy & Dew, 2005.

Transposing the causal/effectual model to entrepreneurial discovery processes

We here see that these black holes could potentially emerge in regions when initial strategic discussions produce new opportunities that may not perfectly align with the desired ends, but at the same time are well embedded into regional networks. Viewed through a causal reasoning lens, these assets may have little value because they do not align well with the desired end goal, even if they may represent a perfectly acceptable stepping-stone towards one desirable future (i.e. they are visible through an effectual lens). This provides a prima facie explanation for Sotarauta's 'black hole' problematic, namely that if entrepreneurial discovery processes in regions adopt a causal entrepreneurial reasoning approach rather than an effectual entrepreneurial reasoning approach, they may overlook capacities and incremental gains embedded within existing innovation collective assets in the pursuit of a distant desirable future.

We regard the reason for this situation in that the regional innovation strategy approach in Europe has emerged to emphasize logic, structure and reason, providing a controlled approach for regions to follow to avoid copying supposedly best practice regions (Boekholt, Arnold, & Tsipouri, 1998). Indeed Boekholt et al.'s model of what was then called the Regional Technology Plan approach has been seamlessly transposed into regional innovation strategy approaches in which causal reasoning is central (IRE, 2007; Socintec, 2004). The approach involves systematically developing strategies that collectively agree desirable directions of travel and regional futures. To deliver that desirable regional future, regional partners follow a strictly prescribed process mapping assets, identifying potential linkages and gaps and, finally, proposing policy interventions to fill those gaps. On the basis of Table 1 above, we distinguish the ways that this structured reasoning could differ in the outcomes depending upon the association with causal and effectual entrepreneurial reasoning. Drawing Foray's (2015) characterization for entrepreneurial discovery processes, we produce two stylized models of entrepreneurial discovery processes, summarized in Table 2 below:

Table 2. Stylized distinctions between causal and effectual reasoning in entrepreneurial discovery processes.

Issue	Causation reasoning in entrepreneurial discovery	Effectuation reasoning in entrepreneurial discovery
View of the future	The future region can be	Future trends may create

region: prediction vs control	predicted based on past experiences and with input from external consultants regarding future trends that allow an accurate future picture to emerge.	opportunities that might benefit or penalise the region; it is important to harness the region to trends that will lead to growth-investment scenarios, and policy can co-create these futures.
Givens: goals vs means	The purpose of a regional strategy is articulated in its goals and visions, setting concrete and measurable targets with means being chosen to deliver those desirable targets (e.g. high-technology job creation).	The purpose of a regional strategy is to articulate assets and capabilities, and in particular the capabilities within networks to create potentially competitive new combinations.
View of risk and resources: expected returns vs affordable loss	Selection of projects and instruments based on return to public investment and leverage against the desired headline targets.	Selection of projects and investments on the basis of what is most necessary to support the regional entrepreneurial ecosystem and to stop negative domino and shadow effects from failures.
Attitude towards unexpected events: avoid contingencies vs embrace contingencies.	Avoid contingencies: take aversive action to avoid obstacles and plan/ select activities to reduce risk to a minimum.	Embrace contingencies: do not avoid risks, leverage them into new opportunities. Surprise is good for discovering new directions.
Outsiders: competitive behaviour vs partnerships	Focus on supporting individual actors to maximise their private gains from innovation activities	Focus on building partnerships and shared collective assets that help to stimulate regional knowledge spill- overs that densify the regional innovation ecosystem.

Source: Authors own elaboration.

The framework above provides means to address the question of whether there is an association between causal entrepreneurial discovery processes and a failure to develop strategies that embed collective innovation assets through strategic investment programmes. We would hypothesize in this case that these failures to develop embeddedness would be associated with particular kinds of strategic behaviour in RIS processes, namely: attempting to predict a desirable future; operationalizing a pathway to that future with clear targets; selecting processes that deliver against those targets; avoiding risky activities that do not necessarily immediately deliver against those targets; and channelling public investment resources to individual companies to generate those targets. In this paper, we therefore ask the operational research question of ‘what are the factors that encourage entrepreneurial discovery processes in less munificent regional environments towards causal rather than effectual forms of entrepreneurial activation?’.

Methodology & introduction to the case-studies

To answer that question, we adopt an exploratory-hermeneutic approach in which we examine a limited number of entrepreneurial discovery processes associated with regional smart specialization. We have proposed a conceptual distinction between two kinds of entrepreneurial discovery process,

and we are thus seeking to understand whether those features are found in reality and what are the underlying dynamics of those situations. We apply a case study approach in which we seek to generate a deep understanding of the chosen situations to be able to effectively characterize the nature of those entrepreneurial discovery processes and relate them back to the ability to progress in smart specialization.

The three case study regions are wrestling with issues of path-creation due to the decline of their traditional industries (textiles and agricultural products). In these regions, regional policy actors have sought to bring together new networks of innovative companies and their universities in an attempt to generate new sources of regional competitive advantage. The case study in each region was based on a similar approach, seeking to understand the policy and strategy processes by focusing on the minutiae of the development of regional innovation strategies. In each region there was a mix of primary stakeholder interviews and secondary documentary analysis within the framework of a larger comparative research project. In this paper we have selected the material relating to their entrepreneurial discovery processes, to stylize those regional processes through a thick description approach. On that basis, we produce a schematic reading of effectual and causal entrepreneurial discovery processes, which in turn provides us with the material to answer our research question.

Aveiro

Located in the Centro region of Portugal, Aveiro is comprised of 11 municipalities of roughly 370,000 inhabitants. Its economy is primarily industrial in the sectors of food, metallurgical, chemical, non-metallic minerals, automobile, electric and IT sectors, with significant exports and a strong SME base (Rodrigues & Teles, 2017). The lead administrative body in Aveiro is the intermunicipal community CIRA, formed following Law 11/ 2003 which allowed legal personality for municipal associations. CIRA has a non-elected leadership and is associative in character, with its member municipalities granting it certain competencies in regional development to deliver common interests. The University of Aveiro (UA), as a key innovation actor, has encouraged CIRA to build relationships between local and regional actors, such as local governments, higher education and research institutions, firms and industrial agencies. CIRA has promoted a set of key strategic projects around sustainability, innovation, competitiveness and overall development of Aveiro, articulated through CIRA's Territorial Development strategies (2008–2013 and 2014–2020). The first of these was inspired by the Triple Helix model (Rodrigues & Melo, 2013; Rodrigues & Teles, 2017) whilst the latter applied the principles of the smart specialization framework to ensure compliance with European Structural Funds requirements (Da Rosa Pires, Pinho, & Cunha, 2012).

Twente

The Twente region, located in the Eastern Netherlands, emerged as a centre of textile and engineering industries, which steadily declined in the post-war period. The region is formally constituted by 14 municipalities – five primarily urban and nine rural – within the Province of Overijssel and shares a border with Germany. Since the early 1990s Twente has developed technology systems and materials industry as an extension of its engineering industries, with some sectors around mechatronics developing high-technology innovative clusters. Yet, Twente persistently lags behind the Dutch average in terms of unemployment and economic growth. The Twente region had formal legal competencies in regional economic development until 2014, when a new national law handed those competencies to the higher provincial level, and in Twente what remained was a purely voluntary group seeking to exert informal leadership. This involved an inter-municipal regional organization, the province and a regional economic development board involving business, government, education and public services. In 2007, regional actors developed a collective Regional Innovation Strategy entitled the 'Agenda of Twente' with 'high-tech' as an all-embracing theme, aiming to make Twente a top-five

European knowledge region. Since 2014, regional partners have developed a new strategy, the 'Agenda for Twente', as an investment process with similar but not identical aims for the Agenda of Twente.

Lincolnshire

Lincolnshire is a rural region with significant economic, social and environmental diversity (HEFCE, 2001) dominated by very small-scale, less innovative businesses with North and North East Lincolnshire having a more industrial heritage; Lincolnshire has 41,000 SMEs as well as Siemens' largest UK manufacturing plant (linked to the University of Lincoln, UoL). The region is primarily agricultural, producing 25% of the UK's vegetables, and its most dynamic sectors are manufacturing, engineering and agri-food, something reflected in the regional development strategy as well as UoL's strategic plan. Until 2010, Lincolnshire was part of the East Midlands region, and economic development was the responsibility of the East Midlands Development Agency (emda), abolished in 2012 and replaced by a local enterprise partnership (LEP) with substantially reduced resources. Lincolnshire LEP was smaller than emda both in terms of its budget and its responsibilities and operated on a voluntary bottom-up basis as a partnership of local authorities and business partners (with rather less representation for the universities than they enjoyed within the RDAs¹). In Lincolnshire there is the peculiar situation that parts of the region are in two LEPs, with the Greater Lincolnshire LEP (GLLEP) formed by Lincolnshire County Council along with North Lincolnshire and North East Lincolnshire councils, whilst these latter two authorities are also part of the Humber LEP.

Entrepreneurial discovery processes in the three regions

Each of the three regions – Aveiro, Twente and Lincoln – has developed a regional innovation strategy in recent years. Partners in all three regions were motivated by a desire to access European regional funds, although none of the regional authorities developed a RIS3 strategy to meet the ex-ante conditionality requirement to access structural funds, being covered by smart specialization strategies at a higher administrative level. In all three regions, there was a genuine desire by regional partners to stimulate a change of regional direction, to create new kinds of innovative business activities that might contribute to improving the innovativeness of regional industry and the wealth of the region more generally. In this section, we present a brief overview of the smart specialization process in each region with particular focus on the entrepreneurial discovery process. In section 5 we then turn to consider whether these represented causal or effectual approaches to entrepreneurial discovery.

Aveiro

The 2014–2020 regional strategy of the region of Aveiro built upon the collaborative momentum that came from earlier initiatives. More precisely, the THM-inspired strategy from the previous period of 2008–2013 is considered the first attempt to develop interaction between regional innovation stakeholders, creating the Urban Network for Competitiveness and Innovation². This network brought together CIRA, UA and two major entrepreneurial associations who, for 12 months, participated in active collective dialogue on local innovation challenges and opportunities (Rodrigues & Melo, 2013).

In the more recent period, structural funds shaped the mode of stakeholder cooperation (Rodrigues & Teles, 2017). In the design of the strategy, an entrepreneurial discovery process was attempted with the engagement of a mixed range of regional stakeholders for the discussion, identification and

¹ Regional Development Agencies.

² Translated from Rede Urbana para a Competitividade e Inovação, in Portuguese.

definition of priorities for the development of the region (CIRA, 2014). Besides all the local governmental authorities represented in CIRA, this entrepreneurial discovery process also involved a joint protocol with UA and an Industry Association. It thus represented the Triple Helix approach with government, higher education institutions and industry all involved in formulating a common strategy for shared goals, underpinned by a joint protocol applied by all partners (CIRA, 2014).

The strategy was explicitly oriented towards accessing European Cohesion funding, therefore adopting European regional innovation policy principles, emphasizing the strengthening of the regional innovation system, and with programmes and actions for the promotion of development, growth, social inclusion and employment. The areas of smart specialization identified consist of: 'Sea and Aveiro Lagoon', 'Information and Communication Technologies', 'Materials' and 'Agri-Food and Forest' (CIRA, 2014).

However, while the collaborative nature of this strategy emerged from a certain relative pre-existing context of partnerships and joint initiatives across multiple sectors, the summary of participation in the entrepreneurial discovery process to three major actors indicates the lack of a comprehensive engagement and articulation of stakeholders. CIRA's Council of Mayors³ and UA were namely the ones that identified and proposed the specialization areas. The entrepreneurial discovery process took place over a two- year period (2012–2014) with discussions dominated by CIRA and UA, a situation also formalized in a protocol that defined the joint ownership of the initiative. The Council of Mayors nominated a team of members and researchers to design the strategy, and the process was approached in three main stages (CIRA, 2014; Rodrigues & Teles, 2017). The first stage involved an analysis of the regional entrepreneurial ecosystem within its wider international context, alongside a survey of regional stakeholders from academia, business, the public sector and civil society. The second phase was a multi-level tuning process, particularly with Centro's RIS3 strategy, Portugal 2020 and the EU Cohesion framework 2014–2020, incorporating assessments of previous regional instruments; priorities and innovation potential was included in this phase, with various regional stakeholders participating in this activity, led by representatives drawn from participating municipalities. The third phase involved developing the action plan and monitoring mechanisms for the projects to permit cross-sectoral and multi-level investments.

Although this procedure benefitted from previously established routines of interaction and cooperation, the greatest tension in this process was in broadening the network of engaged regional stakeholders (Rodrigues & Teles, 2017). Following previous initiatives in Aveiro, the territorial development strategy and the programmes that followed had become extremely reliant upon the 'governance architecture' established by two main agents, CIRA and UA, who were able to mediate through decision-making deadlocks. While both witnessed an expansion of their institutional role and the scope of their missions, overall modes of participation in the policy process suffered no significant change and call for the engagement of stakeholders remained mostly top-down, not expanding to a more inclusive and bottom-up process. The shift in the policy process needed an enhanced governance arrangement with additional structural capacity, but evolution was restricted to transitioning towards a more complex co-production system (Rodrigues & Teles, 2017).

Twente

In the case of the Twente region, at the end of the first strategic cycle, regional actors believed that any new agenda should be more strategic and regionally relevant, involving more significant

³ The Council of Mayors is composed of the mayors of each of the municipalities of the region of Aveiro, namely Águeda, Albergaria-a-Velha, Anadia, Aveiro, Estarreja, Ílhavo, Murto, Oliveira do Bairro, Ovar, Sever do Vouga, Vagos.

stakeholders and avoiding the dilution of priorities that had allowed the expenditure of €1M on a swimming pool under the heading of regional branding. The process was handed in the first instance to a newly constituted Twente Board, a collaborative body formed between 2012 and 2014 with 10 representatives from industry, government and higher education institutions. Although the Twente Board had not been involved in the previous strategy, their mandate was very similar, namely to propose regional strategy that enhanced regional economic development and internationalization, focused upon technology, entrepreneurship and the labour market. The Twente region has long been criticized for its plethora of boards, platforms and valleys that perform largely identical functions, and it was hoped to bypass this institutional tangle by giving the Twente Board overall responsibility, rather than being driven by the regional body under oversight of the municipalities, which had characterized the first strategy.

The process of developing the new strategic agenda for the region started in earnest in 2015, when the Twente Board was first asked for advice on the potential contours of a new strategy, with concrete input for a new agenda collected from January 2017. This first exploratory phase included feedback and constructive contributions from diverse regional actors, with the first draft including input from stakeholders like municipalities, business representatives, educational institutions and civil society. This framework document identified a number of key issues for Twente, including the low skills level, declining rural quality of life, a lack of attention for agriculture and recreation, accessibility, talent retention, regional profile/ branding and strengthening regional co-operation. On this basis, a set of objectives and four action lines were proposed for the next 5 years (2018–2022), building on this exploratory phase, and there were serious attempts in creating the second regional strategy to address some of the issues that had emerged in the first strategy round (see Table 3).

There were various critical moments and problems in the process of developing the new agenda that showcase the difficulties the diverse stakeholders have encountered. One key problem that emerged was that attempts to sharpen the focus of the strategy raised resistance from participating municipalities. The Twente region has long been characterized by a fear of the outlying municipalities of a domination through the urban municipalities, and particularly the primate city of Enschede. The second strategy proposed to target investments more on the urban areas and more on high-technology areas, and by implication less on the rural areas. At the time of writing, two municipalities had announced they would not participate in the Agenda for Twente, the smallest of the three cities (Almelo) and the western rural municipality of Hellendoorn.

Table 3. Examples of the weaknesses of the AvT1 and proposed solutions for the AvT2.

Problem in AvT1	Proposed solution for AvT2
Not all the financed activities were actually beneficial for the region as a whole (e.g. swimming pool, soccer fields)	<ul style="list-style-type: none"> • Clear focus on projects/activities in line with the strategic infrastructure of the region; • Proposed activities have to be in line with the 4 overall action lines and undergo a process of revision of the one of the 4 'action line tables', a financial committee and the Twente Board.
The HTSM sector is a very specific sector, that not everybody, and especially not every project, can identify with	<ul style="list-style-type: none"> • The new focus/spearhead is "technology" as a whole and not HTSM as a specific top sector; • Technology it is supposed to be an enabler for other things to happen, it is described to be in 'Twente's genes' and can make the

Very scattered or missing governance and monitoring	<p>region competitive on the long-term.</p> <ul style="list-style-type: none"> • The TB will act as a steering and decision-making body that oversees project choice, implementation agendas, etc.; • There will be public tables for each action line which discuss topics and activities within their line and have the power to evaluate and recommend projects; • Interviewee: "you want to have an interrelation between those different initiatives so they make each other stronger and you get more impact... going from short-term to long-term... not everyone doing something..."
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Source: Authors own elaboration.

Lincolnshire

In the case of Lincolnshire, the strategic process from 2012 developed a LEP strategy for the first time, with little direct inheritance from emda's processes. For the purposes of this case, Greater Lincolnshire LEP's Strategic Economic Plan is the key strategy seeking to influence regional innovation and economic growth. The LEP emerged in a relative hurry because of national political pressure to abolish the regional development agencies, and in the absence of existing strong real networks, developing the strategic plan was a hasty process. The strategy was produced as a result of engagement with 'hundreds of businesses, local authorities and trade bodies'⁴. However, in this emergent process, the University of Lincoln (UoL) assumed a highly important role. The university's own background endowed it with close links to the County Council. As the University of Humberside it had opened a campus in Lincoln in 1996 with strong County Council support, which had later become the university's main campus (with its Hull campus closing down entirely). UoL had been a strong advocate for the County Council in bidding for LEP status, and UoL employees were involved in many of the working groups developing the Strategic Economic Plan (SEP), sometimes on partial secondments (Regeneris Consulting, 2017). At the time of writing UoL chaired GLLEPs Innovation council, a subgroup of experienced innovators providing input into the regional innovation elements of the SEP.

UoL emerged as a key player in this SEP and ensured that the regional key priorities were strongly linked back to the university's core areas. The SEP identified three main sectors as priorities – agri-food, manufacturing and engineering and the visitor economy. These were simply identified as the major sources of value added in the region – agri-food is well above the UK average, manufacturing and engineering is a little above average, and the visitor economy whilst near the UK average in size is particularly important to the coastal towns. Additionally, three emerging sectors were identified based on the existence of specific projects or local assets – low carbon, ports & logistics and health & care – areas where there was potential in regional industry as well as research base. Whilst these latter three sectors in particular potentially fit with the principle of smart specialization, they were apparently identified by the LEP board through a top-down process rather than a bottom-up entrepreneurial discovery process, led by local businesses in the sectors. None of these sectors are particularly research-driven, although the university is active in several, supporting local industry through skills and knowledge transfer. UoL has strong links to Siemens in its Lincoln campus, as well as to agri-food

⁴ See: www.greaterlincolnshirelep.co.uk/priorities-and-plans/strategies-and-plans/.

through the National Centre for Food Manufacturing located at the Holbeach Campus, with the university undertaking much activity in business services and incubator structures.

The GLLEP developed a strategy for delivering the European Structural and Investment Funds whose innovation focus drew on 'university-led research supporting key sectors; effective knowledge transfer and good quality education and skills development' (GLLEP, 2016, p. 49), as well as greater use of broadband technology. GGLEP claimed that the innovation strategy had been developed in accordance with European smart specialization guidance 'driven by analysis of our knowledge/research and development assets, sectoral strengths and competitive advantage' (2016, p. 53). Despite these claims, there was a sense that the strategy emerged as a very traditional horizontal regional innovation strategy, drawing on the university as the main source of local expertise, in an area lacking other research facilities. Indeed, the innovation programme was subcontracted to the university to deliver and focused primarily upon supporting all eligible SMEs with research and development projects, innovation vouchers and advice, rather than targeting in line with smart specialization.

There were two main issues with a more developmental approach to smart specialization in Lincolnshire. The first was the absence of long-term academic networks with a strong regional focus; the relative sparseness of the academic environment made it hard for researchers to maintain an academic profile whilst working with regional businesses, and researchers often moved outside the region, taking their contact networks with them. The second was the fragmentation in the business sector, with many very small businesses requiring extensive bespoke support to self-consciously decide to become innovative companies, whilst at the same time also being invisible to regional strategy makers.

Effectual & causal entrepreneurial discovery repertoires

Aveiro

In the case of Aveiro, it is possible to identify a very strong causal logic running through the development of the more recent regional innovation strategy, derived from its top-down nature between CIRA and the University. Although there were efforts made to involve a wider selection of participants than in the previous triple helix strategy, its bureaucratic logic identified a desire to create certainty around a set of potential future sectors, as well as creating an administrative structure to deliver that certainty. The four sectors chosen in the strategy became an end in themselves rather than necessarily a means of mobilizing actors to propose and develop innovative projects that might create regional spill-over effects. The desire to retain control over the process within the core entrepreneurial discovery team (CIRA and UA) reduced its flexibility to operate and created a rigidity in the process that did not allow it to meaningfully build upon what it inherited from the previous regional innovation strategy. It therefore appears to be associated with this regional innovation stasis.

At the same time, it is possible to identify elements of more effectual reasoning in the entrepreneurial discovery process of Aveiro. Interviewees confirmed that the first strategy formulation process enhanced the overall capacities of diverse partners, in which they both learned how to work together but also learned about each other's operational capacity below the strategy level. One example of this was the emergence of a regional specialization area that genuinely reflected regional uniqueness. The lagoon area is a dominant physical feature of Aveiro and it is therefore unsurprising that a wide range of different partners had developed different kinds of knowledge and products related to its development. There were also a number of activities proposed for support that sought to bring different networks together, for example around maritime engineering and ICT, to create new telemetry devices for the ocean. In linking between these two communities with their very different

orientations but the shared regional embedding, the regional strategy was able to promote something that had the potential to be useful in terms of building up regional critical mass for innovation.

Twente

In Twente, the regional stakeholder partnership inherited a causal mind-set from the initial regional innovation activity, in which Twente Index had been created to facilitate the measurement of the progress towards the desirable future. In the context of a fragmented group of regional stakeholders, this measurability had persuaded regional partners of the need for coordinated action, but at the same time had strengthened a belief that all the valuable contributions were measurable. All activities oriented towards capacity building, particularly the capacity within innovative networks, were therefore only visible if they also included measures in the short-run to stimulate economic activity. Likewise, causal reasoning had been implemented in a far-reaching way in the selection process for new projects and activities, which involved a 3-step procedure through decision-makers at working tables, a financial board and finally the Twente Board itself, evaluating return on investment and strategic alignment. This selection process (what at the time of writing was not complete) was planned to drive activities towards that most obviously fit with long-term goals and away from those that focused on more plausible capacity creation. By trying to plan around possible obstacles and minimize risk, surprise factors and innovative, unexpected developments were eliminated from consideration, encouraging a continuation of initial activities rather than seeking to exploit embedded capacity.

There were also clearly effectual processes present, because regional partners were smart enough to appreciate that the strictly causal logic was missing something. On some occasions, the three-step procedure deviated from what was intended to move away from selection towards construction, where changes to projects were proposed, or new ideas proposed, to exploit existing capacities and create novel combinations. One area where this was particularly important was around the significance of technological projects for Twente's rural hinterland; the initial emphasis on being a leading technological region was quickly realized as being irrelevant for these rural regions, and therefore efforts were made to articulate a wider range of regional strengths. A final effectual element can be seen in the plethora of boards and structures that typified Twente emerging out of a reluctance to omit any potential from strategic processes and to build in substantive redundancy to strategy processes. Calls to 'simplify the structure' can therefore be regarded as being underpinned by a causal element that overlooks the coupling between substantive networks that was regarded as important to stimulate economic development in a region with a strong understanding of its own shortcomings.

Lincolnshire

In Lincolnshire, a number of different causal lines of reasoning can be seen in the processes towards the creation of the GGLEP and its regional strategy. Firstly, the partnership was created in great haste and underpinned by a political need to create anything to replace the abolished regional development agency. In this process, what was necessary was to have a long-term vision and a first short-term plan to achieve it, in the context of partners with no underlying knowledge of the capacities embedded into regional networks. Instead of finding partners and creating networks around regional assets, the logic that prevailed in this interest was the need to fulfil functionalities that created the basis for cooperation. Additionally, the clear role of the UoL in identifying core areas of the regional strategy, in line with its own preferences, hints toward causal logics, that support individual actors more than creating partnerships to stimulate knowledge sharing and spill-overs. More generally, the definition of emerging sectors within Lincolnshire was described by a number of interviewees as a primarily top-down process, with little capacity to embrace contingencies or leverage new opportunities.

At the same time, some aspects of effectual thinking can be identified, particularly as far as the processual arrangement of strategy making was concerned. A key element of this was the way in which the UoL seconded a number of staff to work at the county council. These secondees were working to identify common ground between partners and to build a wider, shared understanding in a way they believed could not be delivered through orchestrated periodic meetings when attendees were representing their host institutions. Although the level of common purpose appeared not to be as great as that in Novel-T in Twente, this bilateral secondment created a sheltered space where a common interest could be built up as the basis for coordinated actions towards more representative regional outcomes. It is important not to exaggerate how extensive these effectual logics were (particularly given the speed with which regional partners found themselves having to develop the strategy). Nevertheless, even where top-down processes were used to identify priority sectors (a causal form of reasoning), there was a sense amongst partners that this was a temporary situation for the purpose of capacity-building and developing a better understanding of regional innovation access.

Reasoning approaches in entrepreneurial discovery processes

We now relate this to our overall conceptual framework, which has sought to distinguish the dynamics of causal and effectual reasoning evidence in entrepreneurial discovery processes creating regional innovation strategies.

Causal reasoning in entrepreneurial discovery processes

On the basis of our three case studies, we identify three causal reasoning repertoires recurring in these different cases, namely that strategic choices ‘freezing’ at the moment of publication, the complex project selection reflects those moments of ‘freezing’, and a tendency to select partners based on their parent organizations rather than their capacity to mobilize capacity for regional collective action. These three factors together tended to have the common effect that continually undermined progress and led to situations of strategies repeating themselves rather than adding up over time to represent a coherent programme of interventions that would contribute to knowledge-based regional development.

Firstly, it was clear that the defined strategies froze at the moment in time to which they were reacting, and before this point there was some flexibility to choose between different potential directions. However, once the direction of travel was chosen, that direction became internalized as a necessary condition rather than one possible desirable future. This in turn engendered an extremely low flexibility to react to future events; in effect, they had made it impossible for themselves to succeed because there was never a chance that exactly those futures would be delivered, but any deviation from that path was seen as being somehow undesirable.

This relates to the second element of causal reasoning within the process, which was the selection of projects to receive funding, and the way in which the derivation of selection criteria from the strategies reduced the flexibility to consolidate and build up projects in interesting and productive directions that were not specified *ex ante*. This had the effect of leading to all the chosen projects being constructed in an artificial way to be able to prove that they met the requirements of several years earlier, not what was then necessary, and certainly not reflecting the capacities that had been created in these projects that did not immediately and directly relate to what had previously been specified in the ‘frozen’ strategies. This clearly made it hard for them to build up into overall regional transformation.

The third area of causal reasoning was in the assembly of the individuals to be involved in strategic activities. In all three regions, partners were selected to participate in strategic activities because they held a representative position in one of the participating organizations rather than because they had the contacts, skills and resources to deliver effective projects. The issue here was that these

representatives tended often moved on, and therefore those skills, contacts and resources were lost from the strategic team. This provided a third factor which in turn made it hard to build up and develop activities within a region – although there were examples of where individuals had moved between different roles within these partnerships and this had contributed to some progress and away from falling into black holes.

Effectual reasoning in entrepreneurial discovery processes

We have been able to recognize three repertoires of effectual reasoning present in the different cases, where strategies represented pathways, where attempts were made to create flexible organizations that could react to events, and changing participants based on their responses and not their representative function. Firstly, there was an evolution in all three regions away from setting a goal that was ambitious towards setting a goal to adopt a new way of working, thereby avoiding the risk of trying to achieve an unattainable goal. The best example of this was in Twente which abandoned the strategic desire to be a top high-tech region, and instead argued that it wanted to be a region in which technology played a fundamental role, thereby shifting the focus away from GDP levels towards the adoption of new kinds of techniques and practices by regional industry.

Secondly, there were examples of regions adopting techniques and organizational forms to avoid a kind of fossilization highlighted in the causal reasoning. This was most evident again in the case of Twente when there was a parallel discussion structure that reflected on how the region was developing and what was necessary, and those discussions were fed back to create new projects. Even if that approach did not address the issue of static end goals, the ongoing reflection process brought a degree of updating to the ways partners understood those end goals.

Finally, in all three of the partnerships there was an evolution in participants that was at least partly driven by a desire to refresh partnerships with partners who had resources and assets that could potentially contribute to realizing useful projects. In the case of Twente, further education became involved as it was obvious that the college could contribute and benefit from some of the projects in association with the university of applied sciences around materials innovation and entrepreneurship. The best example of this was seen in Aveiro with the emergence of the Smart Coast Initiative; where a few regional partners realized the importance of connecting different sectors around the maritime topic, until it has become an important part of the strategic direction of the region.

Embedding effectual entrepreneurial activation in smart specialization processes

In this paper, we have asked the research question of whether effectual approaches to regional innovation strategy are a way to encourage the development of regional embeddedness. Our first observation is that it is indeed possible to distinguish in our empirics between causal and effectual kinds of reasoning in entrepreneurial discovery processes, and they also seem to correspond with what we expected, namely that causal reasoning would be static and restrictive, whilst effectual reasoning was associated with more iterative and progressive strategies. There are three more specific points emerging from our analysis that are salient to answer the question, namely that effectual reasoning is more selective, that particular kinds of processes appear necessary to enable effectual reasoning and that there is a key role for regional leadership (cf. Grillitisch & Sotarauta, 2018). At the same time, we acknowledge that this was a small, exploratory study seeking to understand the dynamics of reasoning in regional strategy processes, and we must remain modest here in our claims, in that they are more

suggestive than definitive. Nevertheless, the issue of effectual reasoning appears to be a worthy avenue of study to help improve the embedding of regional innovation systems.

The first issue is that the causal reasoning processes produced regional strategies that were relatively easy for regional partners to support, in that they excluded almost nothing, but at the same time that meant they did not provide a useful selection guide for regional partners. The hard choices that were made were not about choosing between two equally unlikely future technology sectors but identifying what might be considered as regional styles of innovation, such as Twente choosing to implement technology as its unique selling point or Aveiro's rediscovery of the contemporary potential of its longstanding strengths around marine and maritime technologies related to its lagoon. Although it is perhaps obvious, it is worth emphasizing that this approach, in selecting a few areas that are good enough, is at odds with the whole contemporary public policy approach of new public management (cf. Kickert, Klijn, & Koppenjan, 1997), in which potential choices are made on the basis of scoring, evaluating, comparing and dispassionately choosing. Therefore, this suggests that the effectual reasoning approach needs to be accompanied by a change to market-driven approaches to public policy-making.

Related to the first, our second point is that effectual reasoning emerged in processes that permitted effectual reasoning. In situations where these new public management repertoires dominate – evaluating and comparing competing options – there is almost no room for effectual reasoning to be used. We note that the whole entrepreneurial discovery process as constituted allows for the possibility that it will be causal (comparative) or effectual (constructive), and no guidance is given as to how to drive to one or the other. But we likewise note that the wider meta-narrative of regional innovation policy has been based on a causal logic, that regional innovation systems are knowable, that gaps can be identified and filled. The entrepreneurial discovery process appears to have been intended to change that mindset, but by building on the existing repertoires of regional innovation policy, that embed causal thinking, they undermine the opportunity to drive genuinely constructive innovation policy processes. Delivering Cooke's transversality requires the deployment of novel repertoires that permit and facilitate this flexible and constructive thinking (Asheim, Boschma, & Cooke, 2011)

Our final conclusion relates to the role of regional leadership and these reasoning processes (Beer & Clower, 2014). Representatives in regional leadership forums appear to have to have a primary concern with their individual institution's wellbeing and therefore seek to create strategies that appear to guarantee their institution will benefit from the policy. This drives towards precisely the 'freezing' of strategies that undermine their flexibility, but at the same time that is unavoidable because of their representative role. In all three examples we saw that the real flexibility and leadership was provided by institutional entrepreneurs below the level of the senior leaders, who were able to mobilize and extend their networks to construct promising projects that supported regional embeddedness. This study therefore backs up the argument of Benneworth, Pinheiro, and Karlsen (2017) that more consideration in regional leadership studies needs to be given to emergent leadership. Most obviously, this highlights the opportunity that emergent leadership creates for effectual reasoning to support in developing embedded regional innovation systems.

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