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The Role of Universities in the Development of Regions: Teaching Regional Science in 2005[1]

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Abstract:

At a recent Regional Science Association International meeting, the presidential address suggested that the future of Regional Science is tied to 1) acceptance by business and government and 2) curriculum developments that make regional science more appropriate for students considering careers in business and government.

Our field needs to grow in size if it expects to embrace new cohorts of students and new public and private research demands. Through three exemples, Portugal, the United Kingdom and the United States, we will be concerned with several beachheads that regional scientists might want to consider taking and holding to assure that our science is effectively represented in the University curriculum.

[1] Paper given at the APDR 2005 meeting in Faro.

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INTRODUCTION: TOWARDS HEALTHY REGIONAL SCIENCE PROGRAMS

There is a growing awareness that healthy University-based Regional Science programs must stress the value of regional science to internal constituencies and to both public and private external constituencies.

This paper discusses ways to make this message explicit in three countries, Portugal, the United Kingdom and the United States, at the undergraduate and postgraduate levels.

In this paper we will not be overly concerned with the content of regional science but we will offer a brief definition which is useful inasmuch as it describes regional science's key attributes: regional science is a theory-based interdisciplinary field that examines the regional economic, cultural, social and environmental elements of sustainable development. It brings to core disciplines such as economics and geography and to the professional field of planning an enhanced understanding of regional systems and spatial processes. Economist pay too little attention to the location of economic activities; geographers sometimes lack rigorous models to study the effects of location and distance on human behaviour and planners can often benefit from the stronger analytical approaches to the examination of the economic and social structure of cities which are offered by regional science.

Despite its obvious power and the maturity that comes with its 50 years of history regional science is usually considered to be a secondary subject, not a primary core field. When regional science is found it is usually a program focus within a core discipline such as economics or geography or a professional field such as planning. Free standing departments of regional science are a rarity.

We think that one way to help assure a bright future for regional science is to expand offerings at the undergraduate level and to more fully integrate undergraduate and graduate programs. We have serious doubts about the wisdom of creating free-standing undergraduate programs. But we do think that the innovation and creative designer of curricula could design a large enrollment course or two aimed at advanced undergraduates. Among the potential benefits are: 1) budget increases in universities that tie budgets to enrollments; 2) expanded graduate student funding to accompany increased needs for teaching assistants; 3) high visibility for regional science post graduate study. We would also like to see regional scientists more active in the generation of grants and contracts to show that regional science is a "high impact" science. Both of these notions are summarized in figures 1.1 and 1.2 (teaching Regional Science in 2005: structures and content).

FIGURE 1.1

Teaching Regional Science in 2005: structures

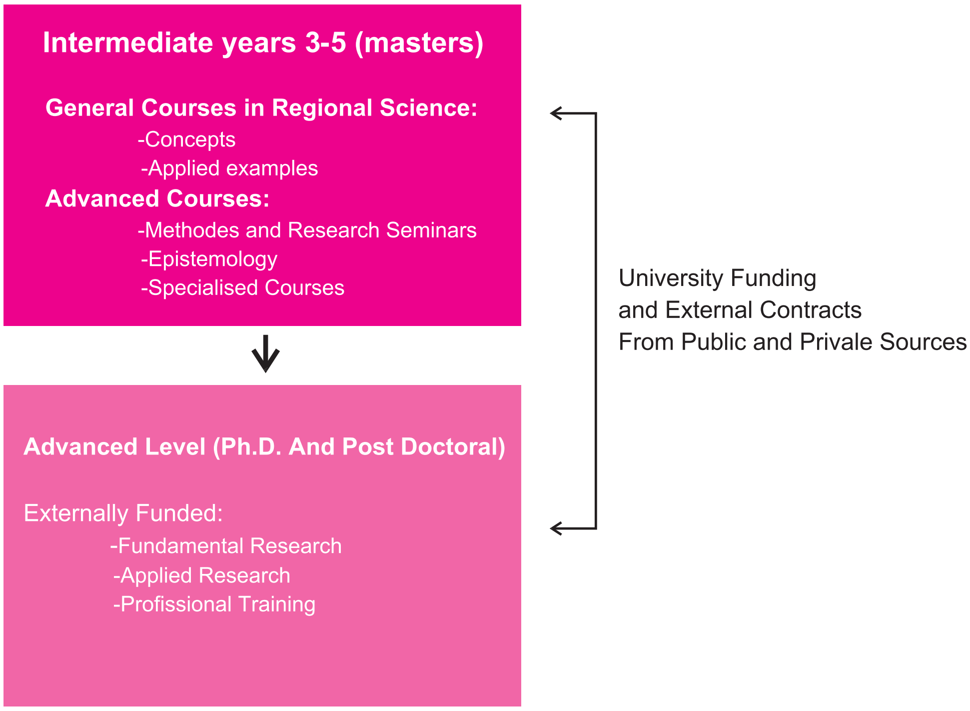
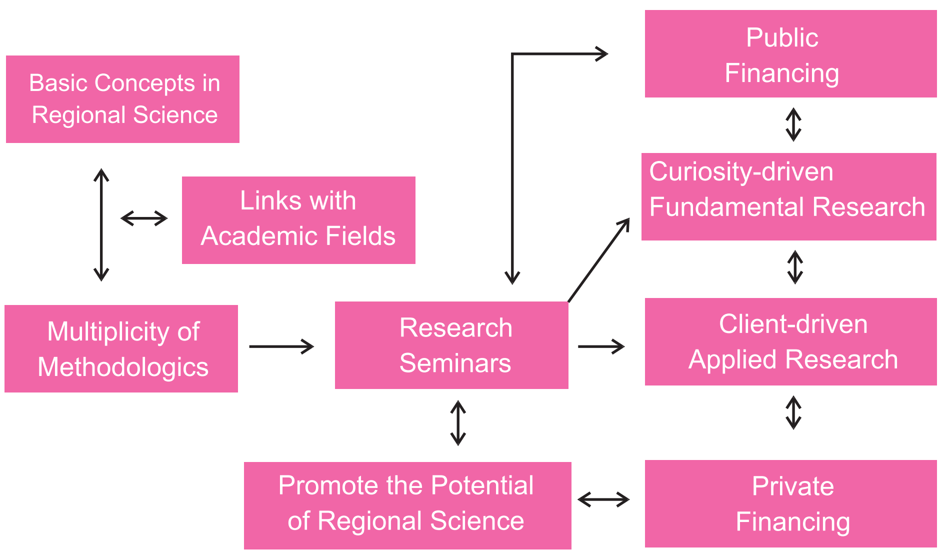


FIGURE 1.2

Teaching Regional Science in 2005: content



2. TEACHING REGIONAL SCIENCE IN PORTUGAL IN 2005

2.1 UNDERGRADUATE LEVEL

We would like to discuss the way teaching regional science at the undergraduate level should be done. Not the way it is commonly done.

To my knowledge, there has never been autonomous university teaching of regional science at the undergraduate level in Portugal. That is, there have not been undergraduate courses in regional science, and I believe it should continue to be so, since regional science demands an interdisciplinary approach which seems difficult (if not impossible) to pursue at the undergraduate level.

However, several undergraduate courses integrate some regional science knowledge (regional analysis, methods and models) as a component. It generally is the case of economics, which I have particularly in mind.

2.2 LEARNING REGIONAL SCIENCE

One basic pedagogical orientation should be adopted: learning regional science, the process of learning, not the process of teaching, should become the objective and the driving line at the undergraduate level. More than "transferring knowledge", the process of learning should aim at developing "students' competences", "students' abilities". Such a process should always count on some previous basic knowledge of economic theory, statistics and econometrics.

The whole process of learning regional science, even in a course of economics, should take development (socio-economic development) as the main broad long term objective. Economics, namely growth, should be taken as no more than instrumental to regional development.

2.3 REGIONAL ANALYSIS

The global framework should take analysis (regional analysis) as a basic step. It should then consider regional policy and regional planning as well. The whole exercise of regional development consists of analysis (diagnosis), policy (identifying possible and realistic strategic measures) and planning (organizing the implementation of strategic policy measures).

At the undergraduate level, emphasis should be laid on location theories and analysis (methods and models). The basic theoretical and methodological steps of policy and planning should also be considered. The spatial organization of society, the efficient usage of resources, the environment sustainability should also be taken as basic guidelines.

2.4 EFFICIENCY

To be efficient, the learning process should depart from concrete problems, that is, concrete real problems. Whenever possible, students should be involved in contract work.

In this way,

- the spatial dimension will be seen as indispensable (problems are differentiated in space; so are solutions);

- theory, methods and models will be found necessary (they are not always well perceived when presented in abstract);

- interdisciplinary approaches will be shown necessary as well (development problems have an economic dimension, which is never the only one, and solutions can only be found inside a broad social and human context);

- systems approaches will be better understood and they will also be found useful, if not necessary (regions should not be taken in isolation, because they interact inside the regional system; urban and rural problems interact as well; the urban system is the "backbone" and the "nervous" system of the regional system);

- regional analysis, regional policy and regional planning will be complementary in tackling development problems; and they will show the relevance and the usefulness of theories and techniques.

At the undergraduate level, regional science should always be assumed and shown as a "useful" science. The same goes to postgraduate levels, though there should also be room for theoretical and methodological sophistication at these postgraduate levels.

3. Regional Science as an Element of Postgraduate Planning Education: A British Perspective

3.1 Introduction

In Britain, there are currently more than twenty universities offering degree courses that are accredited by the Royal Town Planning Institute (RTPI), the professional body for planning. Such courses are available at both undergraduate and postgraduate levels and generally provide the initial professional education for those who intend to work as town planners in government and private consultancies. The postgraduate courses provide a career-oriented Masters degree programme in planning for students from a wide range of undergraduate degree backgrounds, including geography, architecture, economics, sociology, civil engineering and history of art.

British planning education tends to be very broad, particularly at postgraduate level, which means that there is limited potential to study contributory disciplines, such as economics, within a planning course. The absence of this foundation restricts the treatment of the theoretical underpinnings of planning and leads to a situation in which, for example, few planners are likely to study location theory or theories of regional development in any depth. Regional science, if it features at all, usually consists of a fairly basic coverage of techniques for urban and regional analysis.

In this contribution I shall focus on the current scope for teaching aspects of regional science in British postgraduate planning programmes, setting recent changes in an historical context. I shall draw attention to recent changes that have affected how planning is defined as an area of professional activity and the consequences this has had for the design and delivery of planning courses. The paper uses the example of the Masters programme at the University of Liverpool – the Master of Civic Design – to illustrate how urban and regional analysis is taught within a newly-introduced postgraduate course.

3.2 Historical Background

The coverage of urban and regional analysis in planning courses can be traced back to the early 1970s when there was a strong move among academics and practitioners to adopt a more rational, systematic and scientific approach to the preparation of plans. This is often referred to as the 'systems approach' to planning (McLoughlin (1969); Chadwick (1971)). Some of the impetus came from land-use transportation studies that were being undertaken in most of the major conurbations at that time. These studies required extensive data collection and analysis and the use of formal computer-based techniques for projecting population, employment and travel demand. A second factor was the introduction, under the 1968 Town and Country Planning Act, of a new system of development plans involving the preparation of structure (strategic) plans and local (tactical) plans. For many this was the first time they had encountered computers and there was a widely held belief among planners that it was important to embrace the new technology. Prior to this, in the 1950s and 1960s, a planning course was likely to have included traditional data collection techniques such as questionnaire surveys, an elementary course in statistics and some coverage of trend extrapolation to make forecasts. Planning methodology at that time was in its infancy (Batey and Breheny, 1978).

Textbooks from that period (such as Masser (1972) and Lee (1973)) provide a clear indication of what was taught. All students would be expected to cover cohort survival population projection methods, the economic base method, simple input-output analysis and basic spatial interaction models for shopping and journey to work. Those who wished to go into greater depth would be offered more sophisticated methods such as linear programming, simulation methods and markov chain analysis which were beyond the scope of the basic texts. Even though most of the coverage was not particularly sophisticated, the emphasis was nevertheless technical and methods-driven rather than problem-oriented, with the result that planning graduates were generally not well equipped to understand the practical context in which methods could be applied.

This state of affairs prevailed for the remainder of the 1970s and for much of the 1980s. Most planners learnt something about analytical techniques as part of their training but the coverage of methods was unambitious and had hardly progressed from what had been taught at the beginning of this period (see, for example, the contents of Field and MacGregor (1987), a textbook produced in the late 1980s). If anything, there was a retreat and planning education moved away from the formal treatment of urban and regional analysis within professional programmes. With the onset of the 1990s, all planning students were expected to be computer-literate which meant in practice that they acquired basic skills in word processing, spreadsheets, data bases and presentation techniques, and, possibly, elementary GIS. Somewhat strangely, despite the emphasis on information technology, comparatively few planning students became proficient in urban and regional modelling. This field was generally left to specialist applied mathematicians, statisticians and quantitative geographers.

3.3 THE CHANGING SCOPE OF PLANNING

By the start of the present decade, the boundaries of planning as a field of professional activity in Britain had become blurred. The late 1990s had seen a growth in inter-professional working, stimulated by the increasing importance of urban regeneration. It was now common for planners to work in teams with other professionals such as architects, surveyors, management consultants and engineers and to be employed by partnerships rather than in a public sector role. There were calls for a reform of the development plan system which had become increasingly marginalized in the 1990s as non-statutory planning had flourished.

These changes in planning practice prompted debate within the RTPI and led to the production of a manifesto, A New Vision for Planning. This set out a modernising agenda aimed at a wider constituency of planning activity. The key to this was a shift from the traditional notions of Town and Country Planning and Land Use Planning towards a new concept of Spatial Planning. Spatial Planning is seen as being much broader than Land Use Planning. It is intended to concentrate on 'the location and quantity of social, economic and environmental change.' It can be applied at a variety of spatial scales, including large-scale national and regional strategies as well as more local policies and plans for towns, villages and neighbourhoods. The watchwords of Spatial Planning are: sustainable, integrative, value-driven and action-oriented (Batey, 2003).

Planning education has had to respond to these changes in professional practice and in the RTPI itself. A Planning Education Commission was set up in 2001. The Commission recommended a shift away from defining a syllabus for planning programmes and felt that instead there should be a focus on outputs. Has a planning graduate achieved a list of learning outcomes (24 in all) covering knowledge, skills and value-awareness, and a degree of depth in his/her studies? The RTPI accepted these recommendations with the result that postgraduate programmes have, in the past two years, been completely re-designed. The new one-year intensive programmes, now accredited by the RTPI, ran for the first time in academic session 2004-05 and will produce their first graduates in December 2005. The RTPI now gives a large amount of discretion to universities about what they teach and how, a reflection of the Institute's confidence in internal university quality assurance mechanisms.

New planning legislation, the Planning and Compulsory Purchase Act 2004, has introduced a new development plan system which has Spatial Planning at its heart. The new system elevates the importance of regional and sub-regional planning. The new Regional Spatial Strategies will have statutory status and will therefore be binding upon the Local Development Frameworks prepared by individual local authorities. Local authorities and regional bodies are now engaged in an intensive phase of plan preparation. Much more so than before, there is an emphasis on evidence-based policy and on formal systems of monitoring and evaluation.

3.4 An example of the new intensive postgraduate planning programmes

As an example of the new one-year intensive postgraduate programmes, it is instructive to consider the Master of Civic Design degree offered by the University of Liverpool. Originally introduced in the late 1940s, this degree ran for more than fifty years as a two-year, RTPI-accredited programme. In September 2004 a completely new version of the degree was launched, with eight modules taught over two semesters, followed by a dissertation undertaken from May to September. The taught modules – Spatial Planning Challenges, Theory Power and Ethics, Making Places, Making Plans, Implementing and Managing Change, Trends Outcomes and Impacts, and Spatial Planning in Action (a double module) – together cover the core planning topics. All students take the same set of modules.

Of these modules, just two – Making Plans, and Trends Outcomes and Impacts – can be considered as having any substantial regional science content. Making Plans introduces the process of plan preparation and covers the various methods that can be used to undertake the different stages in this process. The methods are an eclectic selection, drawing on operations research, management, economics and geography. Trends, Outcomes and Impacts is concerned with the range of methods and techniques employed in analysing contemporary spatial planning issues and evaluating policy outcomes and impacts. This module can be seen as the descendent of the earlier attempts to teach urban and regional analysis within planning programmes and therefore it is worth examining its content in some detail.

The Trends, Outcomes and Impacts module is organised as five main sections:

- Analysis of trends and spatial patterns with indicators
- Monitoring of change: time series and spatial movement
- Analysis and presentation: SPSS and GIS
- Projections and scenario building
- Policy evaluation and impact analysis.

In Fig. 3.1 the content of each of these sections is outlined. Two comments may be made. First, unlike the earlier urban and regional analysis modules, the sections are all task-, rather than technique-oriented. The emphasis is on identifying a need for analysis and then presenting the most appropriate techniques for meeting that need. The second point is that there is a strong component of practical work associated with each section. A series of computer workshops enables students to gain hands-on experience. The coursework assignments (also referred to in Fig. 3.1) reinforce this point.

3.5 CONCLUSION

This contribution has examined how regional science is taught within British postgraduate planning programmes. It has pointed to the fact that the coverage has always been limited. The recent move to shorter, intensive programmes has put even greater pres-

FIGURE 3.1

The Trends, *Outcomes and Impacts* Module within the Master of Civic Design Programme

1 : Analysis of Trends and Spatial Patterns with Indicators	**2 : Monitoring of Change: Time Series and Spatial Movement**
Development and use of quantitative indicators: evidence policy-making Policy targets and performance indicators: Regional Economic Strategies, Regional Spatial Strategies and Local Development Frameworks A critique of regional competitiveness indicators exercise Making use of existing statistics: ONS Neighbourhood Statistics (Computer Workshop)	Baseline profiling: geodemographic analysis. Time-series analysis: employment and unemployment change. Population Census geographies, and commuting and migration statistics. Geography Cal and Extraction of Census data workshop (Computer Workshop).
3 : Analysis and Presentation: SPSS and GIS	**4 : Projections and Scenario Building**
Use of SPSS for Windows to perform simple statistical analysis (Computer Workshop). Introduction to GIS Map-based analysis and dissemination: GIS (Computer Workshop).	Needs assessment: housing needs and urban capacity studies. Population and household projections. Monitoring of housing trajectories exercise. Sensitivity of projections (Computer Workshop).
5 : Policy Evaluation and Impact Analysis	**Assessment:**
Integrated Impact Assessment Workshop. Key issues surrounding the measurement of policy impact. Concluding lecture: key issues surrounding the data requirements and analysis of socio-economic trends, policy outcomes and their wider impact.	(1) (40%) Techniques Exercise: SPSS analysis and GIS mapping exercises. (2) (60%) Monitoring Changing Socio-Economic Context of a Local Authority: Local Development Frameworks Monitoring Group Project Report.

sure on time within such programmes and has led to difficult decisions about what to include and what to leave out. The advent of Spatial Planning has opened up the potential for a bigger role for regional science – interpreted here as urban and regional analysis - and this has led the Liverpool programme, at least, to use the opportunity offered by a comprehensive re-design of the curriculum to augment and re-orientate this area of teaching. The result is a new module that is more needs-driven than earlier attempts to teach analytical methods.

Such an approach is badly needed. In professional practice, the skills base in urban and regional analysis is dangerously low and as a result there is a heavy reliance on the current output of graduates to provide this input. While in no sense can these graduates be regarded as specialist regional analysts, they nevertheless are better placed to carry out this work than many of their more senior professional colleagues.

4. Teaching Regional Science in the U.S.A

There is a growing awareness within the regional science profession that healthy regional science programs must stress the value of regional science to internal constituencies including students, faculty colleagues, and university administrators and to both public and private external constituencies. This part of the paper first discusses ways that internships, speaker programs, and student involvement in contract work can make these messages explicit. It then goes on to suggest that once client-driven assignments become part of the university-based regional science culture, the entire regional science curriculum should be reevaluated with reference to competency models. There is a renewed interest in competency models in engineering and business; in a perfect world students trained in regional science will sometimes find themselves in direct competition for employment with students trained in business and engineering. We owe it to our students to offer them an education that prepares them to be competitive in the job market not only in terms of technical skills but in terms of other competencies too. And we owe it to academic regional science to make sure that it is appropriately valued by both private and public-sector decision makers.

4.1 The Applied Dimension

The regional science curriculum tends to be driven by scientific concerns which is as it should be. But there is often another message that is unfortunate – the message that curiosity driven research is by definition “deep” and that client driven research is typically “shallow.” This is certainly not the message to send to firms and agencies when the goal is to expand the role of universities in the development of regions. A certain amount of sparring between advocates of basic research and applied research is to be expected but when applied research opportunities are eliminated both the students and the field of regional science lose out.

Three relatively simple ways to help students make the connection between the academy and the workforce and to introduce firms and regional agencies to regional science are: 1) speaker programs; 2) internships; and 3) research involvement.

- Speaker programs are an obvious way to make the classroom-workforce link explicit. Students can put real names and faces together with jobs that draw upon regional science skills to solve real problems. An additional benefit is that speakers become part of the student’s network – they become people who can offer advice and perhaps even help find the new graduate a position in industry or government.

- Internships allow students to “test drive” jobs in specific settings so that they can better evaluate both a type of work and a work environment. For example, students in my University’s large undergraduate program tend to favor assignments in :

- commercial and industrial real estate;
- public planning agencies;
- economic development organizations;
- firms and agencies specializing in geographic information sciences.

- Research involvement is another possibility for undergraduate students and especially graduate students. The links between course work and employment will usually be fairly explicit; assignments may focus on curiosity driven research or client driven research.

All three of these activities offer the student a learning experience but firms and governmental agencies learn too. More often then not these organizations turn to business and engineering for consulting assistance and when recruiting new employees. Speaker programs, internships, and research involvement serve to introduce regional science to perspective purchasers of regional science services and employers of regional science students.

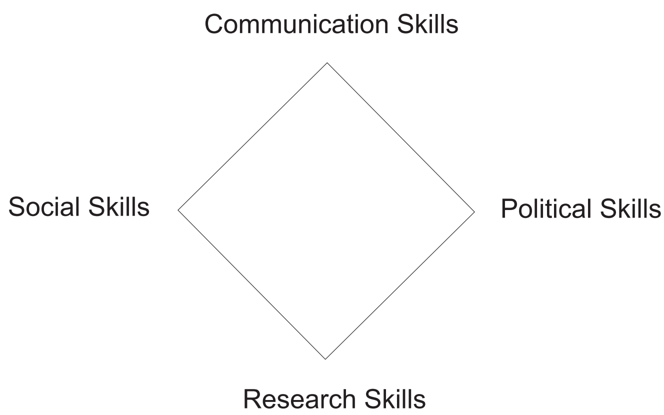
4.2 COMPETENCY MODELS

Regional science programs typically do a good job of helping students improve research skills and understandings but they are much less effective when it comes to helping students actually deliver research as part of a client-driven value-added service. A simple diamond model can be used to remind students that client-driven research requires more than just scientific skills.

Scientific research skills including mastery of regional science methods and techniques are the foundation of what regional scientists do but effective delivery in the public and private market places for regional science products requires that practitioners have solid written, spoken, and graphic communication skills, social skills to promote interpersonal interactions, and political skills to assure the effectiveness of the regional scientist within the corporate and governmental organizations which manage the development of regions.

FIGURE 4.1

The diamond model for client-driven research



The diamond model is useful for laying out concepts but something more is needed for implementation. A recent paper by Gaudet, Annalis, and Carr (2004) holds promise for providing regional science programs with that "something more". Their paper, "Building the Geospatial Workforce" deals with geospatial technology but it seems to have many elements that apply equally to regional science. Indeed, of the four core competency areas, technical competencies, business competencies, analytical competencies, and interpersonal competencies, the only one that would need substantial modification is the one focusing on technical competencies. Specific wording and content in the other areas might change a bit but the generic competencies could probably stay largely as it is – at least initially.

4.3 A first step

This paper does not offer the last word on a competency based model for regional science education but it does suggest a first step, an approach that can be tested, refined and eventually implemented. The original model which was developed by Gaudet, Annalis, and Carr is described in Fig. 4.2 Whereas the list of technical competencies obviously needs modification there is little to suggest that the lists of analytical, business, and interpersonal competencies needs much attention beyond minor changes in wording and the modifications of definitions.

A revised list of technical competencies is found in Fig. 4.3. Is this the last word in technical competencies for regional science? Probably not. But it does seem to be a solid starting point. The eleven items listed under regional science theory and applications are the titles of chapters 2-12 in Isard's 1960 classic Methods of Regional Analysis. A great deal has happened since 1960 – the rise of cluster-based studies and environmental impact analysis to name just two trends – but most, if not all, of these things seem to fit under one of the "big topics" identified by Isard in 1960.

Finally, Fig. 4.4 offers definitions for 26 business, analytical, and interpersonal competencies. These are skills and understandings that will enhance the effectiveness and acceptance of technically competent regional scientists as they apply regional science in both public and private sector work places.

This brief paper is more about the delivery of regional science than about regional science per se. Regional science has a rich literature and the power to be an effective force to "inform policy". But the market place for academic fields which want to "inform policy" is very competitive. Business and engineering, to name two academic fields, stress both technical competencies and the supporting business, analytical, and interpersonal competencies that are essential for efficient and effective delivery of technical value-added services. Regional science will be well served if it too makes the value of these supporting competencies an explicit part of the academic program.

FIGURE 4.2

Geospatial Technology Core Competencies

Geospatial Technology Core Competencies *(Note: Core competencies are shown in bold)*	
Technical Competencies	**Business Competencies**
Ability to Assess Relationships Among Geospatial Technologies	**Ability to See the "Big Picture"**
Cartography	Business Understanding
Computer Programming Skills	Buy-in/Advocacy
Environmental Applications	**Change Management**
GIS Theory and Applications	**Cost Benefit Analysis/ROI**
Geology Applications	Ethics Modeling
Geospatial Data Processing Tools	Industry Understanding
Photogrammetry	Legal Understanding
Remote Sensing Theory and Applications	Organization Understanding
Spatial Information Processing	Performance Analysis and Evaluation
Technical Writing	**Visioning**
Technology Literacy	
Topology	
Analytical Competencies	**Interpersonal Competencies**
Creative Thinking	Coaching
Knowledge Management:	**Communication**
Model Building Skills	Conflict Management:
Problem-Solving Skills	**Feedback Skills**
Research Skill	Group Process Understanding
Systems Thinking	**Leadership Skills**
	Questioning
	Relationship Building Skills
	Self-Knowledge/Self-Management

Source: Gaudet, Annalis, and Carr, 2004.

FIGURE 4.3

Technical Competencies (for Regional Science)

Technical Competencies (for Regional Science) *(Note: Core Competencies are shown in bold)*
Ability to Measure and Assess Relationships Within and Between Regions and to Evaluate Policy Outcomes
(Examining the usefulness of regional science models and approaches to understand the internal workings of regions and the interactions between regions and to evaluate potential outcomes of alternative policies.)
Regional Science Theory and Applications
(Understanding the theory behind regional science and being able to identify and implement modern day applications for it.) Population projection Migration estimation Regional income estimation and social accounting Interregional flow analysis and balance payments statements Regional cycle and multiplier analysis Industrial location analysis and related measures Interregional and regional input-output techniques Industrial complex analysis Interregional linear programming Gravity, potential, and spatial interaction models Channels of synthesis
Technical Writing
(The ability to "translate" technical information to nonspecialists.)
Technical Literacy
(Understanding and appropriately applying existing, new, or emerging models and approaches to regional development problems.)

Source: After Gaudet, Annalis, and Carr, 2004. The eleven items listed under "Regional Science Theory and Applications" are the titles of chapters in Isard's Methods of Regional Analysis: An Introduction to Regional Science.

FIGURE 4.4

Business, Analytical, and Interpersonal Competency Definitions (for Regional Science)

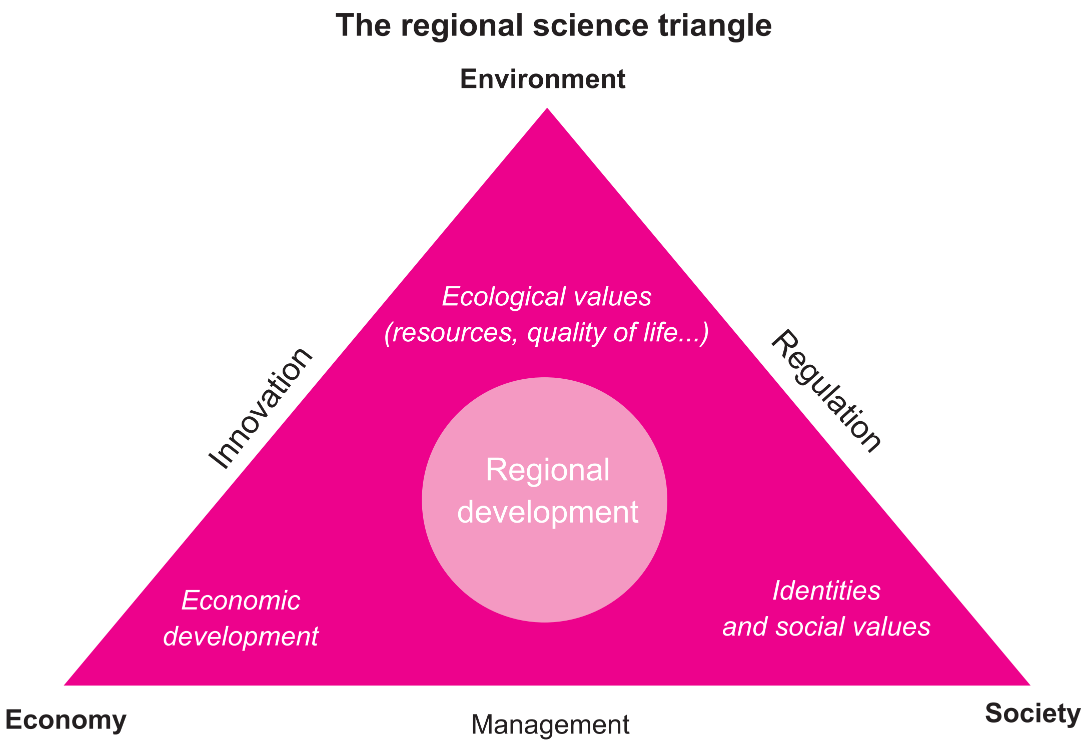
Business, Analytical, and Interpersonal Competency Definitions (for Regional Science)	
Ability to See the "Big Picture" – identifying trends and patterns that are outside a normal paradigm of the organization sources.	**Knowledge Management** – the efforts to systematically find, organize, and make available a company or agency's intellectual capital and to foster a culture of continuous learning and knowledge sharing so that organizational activities build on existing knowledge.
Business and Government Understanding – demonstrating awareness of the inner workings of business and governmental functions and how business and governmental decisions affect financial or non-financial work results.	**Leadership Skills** – influencing process of leaders and followers to achieve organizational objectives through change.
Buy-in/Advocacy – building ownership or support for change among affected individuals, groups, and other stakeholders.	**Legal Understanding** – ability to understand legal issues affecting the application of development policies.
Change Management – helping people adapt to the changes brought on by new policies and strategies and helping them to see the value and benefits approaches.	**Model Building Skills** – conceptualizing and developing theoretical and practical frameworks that describe complex ideas in understandable, usable ways.
Coaching – helping individuals recognize and understand personal needs, values, problems, alternatives, and goals.	**Organization Understanding** – seeing organizations as dynamic, political, economic, and social systems that have multiple goals; using this larger perspective as a framework for understanding and influencing events and change that can impact implementation and support of regional science models and approaches.
Communication – applying effective verbal, nonverbal, and written communication methods to achieve desired results.	**Performance Analysis and Evaluation** – the process of comparing actual and ideal performance in order to identify performance gaps or opportunities.
Conflict Management – helping people work together to resolve disputes through constructive processes and techniques.	**Problem-Solving Skills** – the ability to consider alternative courses of action and select and implement appropriate solutions.
Cost Benefit Analysis/Return on Investment (ROI) – understanding the relative costs of policies and strategies and assuring that the organization is receiving a good value for the dollars spent.	**Questioning** – gathering information from stimulating insight in individuals and groups through use of interview, questionnaires, and other probing methods.
Creative Thinking – recognizing, exploring, and using a broad range of ideas and practices; thinking logically and creatively without undue influence from personal biases.	**Relationship Building Skills** – establishing relationships and networks across a broad range of people and groups.
Ethics Modeling – modeling exemplary ethical behavior and understanding the implications of this responsibility.	**Research Skill** – selecting, developing, and using methodologies such as statistical and data collection techniques for formal inquiry.
Feedback Skills – communicating information, opinions, observations, and conclusions so that they are understood and can be acted upon.	**Self-Knowledge/Self-Management** – knowing one's personal values, needs, interests, style, and competencies and being able to manage their effects on others.
Group Process Understanding – understanding how groups function; influencing people so that group, work, and individual needs are addressed.	**Systems Thinking** – identifying inputs, throughputs, and outputs of a subsystem, system, or suprasystem and apply that information to improve the application of regional science models and approaches; realizing the implications of these models and approaches on many parts of an organization, process, or individual; taking steps to address the impact of applying these models and approaches.
"Industry" Understanding – demonstrating awareness of the vision, strategy, goals, and culture of the regional development field.	**Visioning** – seeing the possibilities of "what can be" and inspiring a shared sense of purpose within the organization.

Source: Gaudet, Annalis, and Carr, 2004.

5. CONCLUSIONS

Regional science can play a vital role in the University curriculum at both the undergraduate and graduate levels. And if strategically placed and properly marketed we think that regional science can inform more effective decision makers in the private and public sectors. We are especially keen on seeing regional science promoted as an applied science. We have no argument with those who see regional science as an element in a student's general education. But we think that the real value of regional science will be underappreciated until it is seen as a powerful approach to solving problems for business and government. The "Regional Science Triangle" (figure 5.1) ties economic, societal, and environmental approaches to understanding regions to the activities as regional management, innovation, and regulation for regional sustainable development. To make the "Triangle" a reality we need more students taking the regional science training into the private and public market places. And for this we need more graduates from regional science programs and more undergraduates with at least an elementary understanding that regional science exists to provide a framework for regional study and management.

FIGURE 5.1



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