

# The Quantitative Social Sciences Initiative

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# The Quantitative Social Sciences Initiative

## Part One. What the QSSI is and why UC Davis needs it.

### 1.1. The Quantitative Social Sciences Today And A Proposal For Their Future

The social sciences at UC Davis are diverse and strong. They address a wide range of intellectual interest and employ a variety of methods. They are represented not only by the departments within the Division of Social Sciences, but by a number of departments in the College of Agriculture and Environmental Sciences, and by some faculty members in a variety of departments and colleges not primarily oriented to the social sciences. Examples of the latter include the School of Law, the School of Medicine, and the Departments of Textiles and Clothing, Landscape Design, and Transportation Studies. The report of the Provost's Advisory Council on the Social Sciences (PACSS) in May 1998 identified 206 ladder-rank faculty members as social scientists.<sup>1</sup> These faculty constitute 21 percent of the faculty on campus, and produce one-third of degrees. The social science departments rank well relative to other departments in national comparisons. As the PACSS report puts it, "[t]he social sciences at Davis can take pride . . . in having achieved comparable prominence and productivity with fewer relative resources than the result of the campus."<sup>2</sup>

Quantitative methods form an important branch of the family of approaches to social scientific questions. The PACSS report advised that

without losing existing strengths in qualitative research [and remaining] *committed to methodological diversity, [. . . ] Davis should shift its mix somewhat.* [It] should focus on catching up and excelling in quantitative techniques, meaning statistical inference and the exploding social-science data base. The rise of quantitative science will definitely continue, and it is a foolish university that expects to rise in the ranks without betting heavily on faculty adept at statistics and other quantitative techniques.<sup>3</sup>

The Committee on the Quantitative Social Sciences Initiative proposes to take an important step towards implementing the advice of the PACSS report. While part of an effort to strengthen the social sciences generally, the Initiative focuses on those aspects of the social sciences that rely on quantitative methods, because they have special requirements that, if adequately addressed, are likely to yield a large return relative to the resources invested.

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<sup>1</sup> Provost's Advisory Council for the Social Sciences, Peter Lindert, Chair. "Strengthening the Social Sciences at UC Davis," 28 May 1998.

<sup>2</sup> PACSS, p. 7.

<sup>3</sup> PACSS, p. 18.

We start on a firm base. A survey (reproduced in Appendix?) below identifies half (105) of the social science faculty as users of quantitative methods.<sup>4</sup> These faculty are engaged in exciting and important research. A very small sample of some of the social science research done in UC Davis underscores its range and policy relevance and the importance of cutting-edge quantitative methods to its success:

- ◆ Professor Niels Waller (Psychology) developed taxometric procedures that permit a quantitative distinction to be drawn between differences in type and differences in degree and applied it the nature of psychological dissociative disorders.
- ◆ Professor Catherine Morrison (Agriculture and Resource Economics) and co-authors used distance-function-based stochastic-frontier production models to evaluate the effect on technical efficiency of a major agricultural deregulation in New Zealand.
- ◆ Professor Jane-Ling Wang (Statistics) with a social science co-author in Washington developed a new statistical test to help assess discrimination against minorities in employment.
- ◆ Professors Lawrence Cohen and Diane Felmlee (Sociology) use sophisticated survey methods to study the effectiveness of the programs of the California Youth Authority under a \$500,000 grant.
- ◆ Professors Xioajia Ge (Human and Community Development) and Juanjuan Fan (Statistics) developed sophisticated techniques for multivariate survival analysis with multiple events to assess recidivism risk among youth offenders.
- ◆ Professor Oscar Jorda (Economics) developed autoregressive-conditional hazard models to understand the factors that influence the decisions of the Federal Reserve to change interest-rate targets and to assess their effect on wider financial markets.

Although there is a firm base for excellent and innovative work in the social sciences, UC Davis, as the PACSS report previously noted, has under-invested in the social sciences, and particularly, in essential social science infrastructure so that there is a well of untapped potential. Adequate investment in what might be called *intellectual and physical infrastructure* will unlock this potential and permit the latent strengths of the quantitative social sciences at UC Davis to be expressed fully. The quantitative social sciences are strong now. But excellence and greatly increased national and international recognition is within our grasp.

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<sup>4</sup> The survey is almost surely an undercount. In particular, it undoubtedly missed some social scientists based in non-social-science departments.

The Committee proposes to improve the infrastructure of the social sciences at UC Davis:

- **First, to create a Center for Quantitative Social Sciences.**
- **Second, to widen and deepen the expertise on campus in quantitative methods in the social sciences by hiring at least ten additional “methodologists” spread across a range of departments.**

Subsequent parts of this proposal describe these elements in considerable detail. Before moving on to them, we address some general issues about the nature and intent of the proposal.

## 1.2. Upgrading the Social Science Infrastructure

A natural question to ask is, why should any initiative single out particular methods? Should not technique follow intellectual substance, rather than substance follow technique? Is there not more common ground among various aspects of, say, the study of poverty or the study of the role of religion in social development than in particular techniques that happen to be sometimes used in these studies? Would it not make more sense to direct initiatives thematically rather than methodologically?

Thematic initiatives may sometimes be useful, but to see why a methodological initiative is likely to be particularly effective in this case, consider an analogy with the economy. The goal of production is, ultimately, consumption and the goods such as food, clothing, cars, computers are obviously valuable. Great intelligence and great enterprise is directed toward producing these final goods and finding better technologies to do it. But the technological advances that demarcate whole eras are rarely those specific to particular end goods but rather the servant technologies. In the 19<sup>th</sup> century it was the railroads and the telephone system. In the 20<sup>th</sup> century, the electric power grid and the Internet that defined the technological environment. A common characteristic of these technologies is that they support and enable a *variety* of more important ends. The same highway carries pineapples and personal computers; the Internet carries genetic research and ads for jeans. These examples of fundamental infrastructure not only yielded high returns for their owners, but also had substantial external effects that improved the whole economy and increased the potential of virtually every other technology. Because an individual owner of infrastructure is unlikely to capture all its benefits, he is also unlikely to invest in as much as is socially desirable. Each of the major infrastructural technologies has needed some government involvement to become fully effective. Who can doubt that the social return to such infrastructural technologies is enormous? Modern economies could not function without them.

In focusing on methods, the Initiative proposes the creation of infrastructure. Like infrastructural technologies, infrastructural development in quantitative methods should have a high payoff, lowering the costs of pursuing cutting-edge research.

Infrastructure is not used metaphorically. The appearance of ever cheaper computers, the Internet and Worldwide Web, as well as more abundant and more easily accessible data, presents a new opportunity for quantitative approaches to flourish in the social sciences. Infrastructure has two dimensions: *intellectual* and *physical*. Intellectual infrastructure includes human resources – an adequate number of faculty in the right departments interested in research and teaching in quantitative areas. But it is not just the bodies; it is essential that adequate investment be made to keep faculty and students up to date on methodological developments. Such investments have spillovers, as the knowledge of one researcher can be passed on to others. Such spillovers will advance the knowledge of quantitative methods on campus in proportion to the effective interaction among different quantitative researchers.

Physical infrastructure includes adequate space for the interactions that promote intellectual infrastructure to take place. Settings are required in which quantitative researchers from different units can meet and share knowledge and results, in which visitors can be housed, in which lectures and classes can be held. Promoting and coordinating such interactions, of course, requires administrative support. The University is generally familiar with the infrastructural needs of the physical and biological sciences, but has tended to ignore those of the social sciences. In part, this reflects the fact that, in the past, very little hardware was needed in most social sciences. While still, by and large, substantially smaller than the needs of the physical and biological sciences, adequate infrastructural support is now just as essential to the quantitative social sciences and has a high marginal payoff – a high “bang-for-the-buck” ratio. The cost of start-up money for a single new chemist, could move an entire economics or sociology department an order of magnitude higher in its ability to conduct cutting-edge quantitative research. As every quantitative researcher comes to rely on ever more sophisticated computers and software, it is essential that appropriate provision be made of both the physical equipment and the human technical support that are required to use it most effectively.

### 1.3. How Does the Initiative Relate to the Social Sciences Generally?

The PACSS report underlined the fact that the social sciences at UC Davis are strong, but could become substantially stronger with adequate resources properly managed. Three points from the report are worth noting here. The first is that empirical evidence demonstrates that social science departments, more so than many other units on campus, are below the size that would optimize their national reputations and rankings. The second is that campus reputations are built on the strength of departmental reputations. The third is that social sciences have taken a quantitative turn and that future development at UC Davis should recognize that fact.

The first feature of the PACSS report is the most easily documented and is widely accepted among social scientists on campus. The second is controversial, since social scientists find research agenda that do not respect traditional disciplinary divisions to be

the most innovative and exciting. The third point is the most controversial, but, the Committee believes, correct and critical in providing the rationale for the Initiative.

The Initiative is structured in full recognition of the importance of these points and of their controversial nature. The organizing idea of the Center is decentralization and appreciation for intellectual diversity. Quantitative and qualitative methods should be viewed as complementary, not as competitive. Quantitative methods have an important role to play in the diverse range of interests of various disciplines. What is more, the role and level of development of quantitative methods is not the same in different disciplines. Some, such as economics, are largely quantitative; others, such as history, are predominantly qualitative, yet present significant opportunities for quantitative research. And the Center aims to foster the independent research agenda of researchers in departments.

At the same time, however, the Committee recognizes that quantitative methods in different disciplines share an important common basis. Although there are non-statistical quantitative methods (e.g., geographical information systems or GIS), statistics – the origins of which, as reflected in its name, lie in the social sciences – is to a large extent a foundational discipline for quantitative methods in the social sciences.<sup>5</sup> But the manner in which statistics are applied have been subject to independent development in different disciplines. This adaptation of techniques to subject matter has often lead to the duplication of techniques in isomorphic forms in several disciplines. The different packages in which similar techniques are found in different disciplines has impeded communication and limited mutual communication. An important element of the Initiative is to foster the cross-fertilization among these disciplinary-specific methodologies and to promote a richer connection with the common statistical base.

#### 1.4. Guiding Principles of the Initiative

This proposal was constructed with a few guiding principles in mind. The first has already received extensive comment: a *respect for the diversity* of social science research. The Initiative aims to be inclusive, to build bridges between quantitative researchers in various disciplines and to live in harmony with researchers employing other approaches.

The second principle can be summed up in a word: *facilitation*. The initiative proposes substantial investment of administrative and physical resources in the social sciences proposes. An important goal is that these resources be placed at the appropriate level of decentralization. Where possible the Center seeks to act as a coordinating body and to focus its primary responsibilities on matters that really are best handled in the center. The overriding aim is to lower the costs of achieving excellence in social science research and teaching, to lead faculty, graduate and undergraduate students to explore

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<sup>5</sup> The original meaning of “statistics” according to the *Oxford English Dictionary* is “that branch of political science dealing with the collection, classification and discussion of facts (especially of a numerical kind) bearing on the condition of a state or community.”

more effectively new directions in social science through better exploiting existing resources and creating new opportunities with high intellectual returns.

The third principle is an *outward orientation*. The Initiative aims to help the quantitative social sciences run more effectively internally, but it recognizes that a primary mission of the University is to serve the larger world. The Initiative aims to enhance the normal research and teaching mission of the social sciences and so to raise their standing, and the standing of the University, in the academic community. It also aims to increase the capacity of the quantitative social sciences to provide outreach to the people, government, and industry of the State of California and wider national and international communities.

## **Part Two. The Essential Core**

### **2.1. The Center for Quantitative Social Sciences**

The Center for Quantitative Social Sciences is the linchpin of the Initiative. All other elements relate to, or depend on it, in various ways.

#### **2.1.A. MISSION OF THE CENTER**

The mission of the Center can be put simply: to foster the highest quality quantitative social science research and teaching on the UC Davis campus. The mission of the Center can be divided more explicitly into four areas.

- ◆ *A Focal Point for Quantitative Faculty.* The aim of the Initiative is lower the barriers that inhibit quantitative faculty in various units from making mutually beneficial exchanges of information and expertise. A Center would provide both a physical location in which quantitative faculty could meet and sponsor activities that would make such meetings occur in the normal course of things. These activities (some of which are described in detail in Section 2.3 below) include sponsoring lecture series and workshops. In addition, we envisage the Center as having some facilities, including office and/or carrel space that would permit it to sponsor visitors to the University and faculty of the University taking local sabbatical from their departments. Discussions across campus indicate that a Center would be viewed as a significant positive element in faculty recruitment of quantitative social scientists generally. And, furthermore, for departments with a small number of quantitative social scientists (perhaps only one), a Center would be regarded as a significant, perhaps critical, element of the quality of intellectual life essential to productive research.
- ◆ *Facilitation of Quantitative Methods within the University.* We envisage the Center as engaged in a variety of activities related to teaching and the dissemination of knowledge about quantitative methods to both faculty and students. Some of these activities are described in detail in Section 2.3 below. The role of the Center in



teaching would be largely one of promoting the coordination of standards (prerequisites and requirements) and course offerings, as well as providing a clearing house for course information. The Center would have a more direct role in the organization of workshops and short courses.

- ◆ *Coordination and/or Administration of Research Infrastructure for Quantitative Methods.* The Initiative proposes substantial infrastructure for the quantitative social sciences. The best organization of such infrastructure is likely to be fairly decentralized and autonomous, rather than under the direct control of the Center. But the Center would serve as a liaison to help keep these units working in a mutually beneficial direction. In some cases, the Center may provide administrative support for infrastructure that would otherwise lack it.
- ◆ *Outreach.* The Initiative envisages the Center as organizing a variety of linkages between the University and the wider governmental, business and institutional community – particularly, but not exclusively, in Sacramento. These outreach activities (discussed in detail in Section 4.4 below) include service to the wider community – for example, inviting a larger audience to courses and lectures sponsored by the Center and even tailoring short courses to the needs of the wider community. Similarly, many agencies require consultation services in quantitative methods, for which the Center might provide a coordinating role. The flip side of this service is that many such agencies have data of interest to researchers on campus, so that Center would help to foster a mutually beneficial exchange.

#### 2.1.B. ORGANIZATION OF THE CENTER

The Center should be regarded as having an essential core and dispersed functions like the hub and spokes of a wheel or a star with an associated planetary system. The core represents the minimal Center the functions of which are needed to make the Initiative worth any investment at all.

The most important function of the Initiative is to facilitate cooperation and exchange of knowledge among quantitative social science faculty, including those in closely related disciplines such as statistics. This is reflected, in part, in the proposal for hiring new faculty (Section 2.2 below). But, of course, this is not all. To simply hire isolated faculty in relatively small numbers would have little external benefits beyond their particular departments and their particular research. The key notion of the Center is to turn, not only the new faculty, but many existing faculty into public goods, people whose expertise and research interests foster, encourage, and promote quantitative social science research across the campus through mutual exchange. The Center is the locus for that exchange. These core activities are discussed in detail in Section 2.3 below.

A Center that was merely a core would be a boon to the campus, but it would fall far short of actualizing the potential for quantitative social sciences in UC Davis. The Committee identifies four additional areas in which the Center should have a role if that potential is to be exploited to the full. This list by no means rules out additional functions in the future. The hub-and-spoke or planetary model has a key advantage that the Center

is organized in a way that can evolve or adapt to changing needs and circumstances, and not all parts of the proposal need be implemented simultaneously. The four areas dealt with in Part Four below are:

- ◆ A Survey Research Center (Section 4.1).
- ◆ Outreach to Sacramento and the State (Section 4.2).
- ◆ Computing (Section 4.3).
- ◆ Graduate and Undergraduate Education (Section 4.4).

The remainder of this part discusses the organization of the core administration. The Committee envisages a Center directed by a highly accomplished quantitative social scientist on partial release from teaching, assisted by staff proportioned to the administrative functions as they develop. In light of the importance of the Center and the pivotal role of the Director, a national search for a suitable candidate is desirable. For the core functions alone this might amount to the equivalent of three-quarter time release for the Director and a full-time staff assistant. The additional functions described in other parts would entail appropriate additional staffing.

The Director would be advised by a steering committee drawn from social science faculty from across the campus. While it is unnecessary to require particular representation on the Steering Committee, it is obviously desirable that the most central social science departments and the Division of Statistics be represented.

Social science faculty who identify themselves as quantitative would be invited to affiliate with the Center. Since a major function of the Center is to promote mutual advantageous exchange among such faculty, the Center would keep and publish a directory of such faculty and their expertise and engage with such faculty both as a provider of services and as a resource for its educational and outreach activities. The Center would draw on such faculty to provide lectures, workshops and short courses as described in Sections 2.3 and 4.4 below.

The Initiative proposes substantial infrastructure. In Section 4.1 below, we propose a Survey Research Center. Ideally, this would be a free-standing unit which reported to the Center for Quantitative Social Sciences. How much of the direct administration of the Survey Research Center was undertaken by the Center for Quantitative Social Sciences itself would depend upon the evolution and success of the Survey Research Center. The Committee also supports (Section 4.3 below) additional computer support divided into decentralized units. In such cases, the Center could serve as a liaison and coordinating body to promote the sharing of information, expertise, data, and software. Representatives of the Center Steering Committee could serve as *ex officio* members of the advisory committees for these units.

## 2.2. New Quantitatively Oriented Faculty in the Social Sciences

The second major element of the Initiative is the hiring of approximately ten “quantitative methodologists” in a variety of departments. The PACSS report highlighted *inter alia* the need in faculty development to achieve critical mass in research “driven by durable trends in societal concerns and research methodology.”<sup>6</sup> While the main emphasis of the Center is to facilitate excellent research with respect to societal concerns, the main emphasis of the proposed hiring is to achieve critical mass in research methodology. This is both a matter of filling important gaps in needed expertise and of building on strength to encourage development of promising directions in quantitative research.

### 2.2.A. THE QUANTITATIVE METHODOLOGIST.

The notion of a “methodologist” needs some explanation. “Methodology” means different things in different disciplines.<sup>7</sup> The Initiative intends methodology to refer to the study of particular research techniques.

Quantitative methodology has developed into an independent subdiscipline in many fields. For example, in economics, *econometrics* and, in psychology, *psychometrics* are distinct areas of expertise with their own, textbooks, courses, journals and professional organizations. But these are exceptional cases. In history, *cliometrics* appears to be a parallel case. In fact, it is more narrowly focused in substance on economic history and in method on econometric-like statistics. There is no field, for example, of sociometrics with a status akin to psychometrics. Most social sciences appeal to general statistics as the source of their methods. But what we regard as setting the quantitative methodologist apart from the general statistician is a rich appreciation of the substantive issues of a particular discipline.

Some might argue that there is no need for specialized methodologists, that quantitative social sciences can easily learn techniques on their own. The Committee disagrees. Intellectual autarky is possible, but here, as elsewhere, there are gains to the division of labor. In an efficient economy, even the farmer is a specialist who buys most of his food in the supermarket. To exploit the division of labor, a quantitative methodologist should be able to teach advanced methods and should be a resource for colleagues and graduate students with respect to particular methods. An important criterion for a methodologist is the ability to teach a short course (see Section 2.3.A

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<sup>6</sup> PACSS, p. 15.

<sup>7</sup> In economics, methodology is the second-order (or meta-) activity aimed at trying to understand logical, epistemological and ontological (and sometimes sociological or anthropological) issues involved in economic explanation and research methods. It is closely akin to the philosophy (and sociology) of science. In other disciplines, such as history or sociology, “methodology” typically refers to the particular techniques of investigation. We use the term primarily in the sense, although the interests of the Initiative may well extend in some cases to the first sense as well.

below) on an advanced quantitative method, which would be useful to his or her colleagues and other sophisticated users of quantitative methods.

But that is not all. The methodologist is also someone who works at the cutting-edge in applying sophisticated quantitative methods to that research. Relative to his or her discipline, the methodologist is an innovator and a student of the latest trends in quantitative techniques. The phrase “relative to his or her discipline” is important. In those disciplines in which quantitative methodology is a field in its own right, a methodologist would be principally a creator of new techniques. But in those fields in which quantitative methods are relatively undeveloped the methodologist may also create, but in many cases – and just as importantly – will import and adapt techniques to the special requirements of the field. The field-specific nature of the necessary adaptations gives the methodologist an important advantage over the quantitative generalist that makes this an activity with high intellectual returns.

The Committee stresses the hiring of methodologists because we see them as faculty with leverage: a good quantitative social scientist can do good research, a good methodologist can move many others to do good quantitative research. Through interaction with colleagues and through providing exemplars of sophisticated quantitative research a relatively small cohort of methodologists can be expected to promote quantitative social science in a way consistent with the PACSS report’s call for “a limited but significant shift in the mixture of research talents of Davis’s social science faculty.”<sup>8</sup>

While for many departments, hiring a methodologist would not be a first priority, the greater willingness of the Administration to make such positions available to departments would provide an opportunity and an incentive. The fact that a methodologist should, in most cases, have substantive research interests other than the methods themselves means that departments do not have to abandon other priorities in responding to these opportunities and incentives.

## 2.2.B. DIRECT ADDITIONS TO FACULTY UNDER THE INITIATIVE

**Note to Interested Faculty:** *In the final draft this section will take a two-tiered approach. It will list a number of positions and detailed descriptions that the Committee proposes should be filled at the earliest possible opportunity. It will also suggest a number of areas in which additional faculty are likely to be sought in future as the Initiative is fully implemented (after hiring a Director). It is part of the philosophy of the Initiative that the faculty proposed under it have the full support of their home departments. This does not, however, mean that the Committee is merely endorsing recruiting requests that departments would make anyway. Rather, the Initiative offers departments the opportunity to work with the Committee (or later with the Center) to develop requests that might represent a redirection of their department plans in exchange for the Administration placing a higher priority on the particular recruiting request. In some cases, this may mean that a department gets a position that it would not otherwise*

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<sup>8</sup> PACCS, p. 18.

*get; in others, that it gets a position sooner than it otherwise would. All positions recruiting under the Initiative are for “quantitative methodologists.” It is worth re-stating here that such a position need only be half methodological and can, therefore, be combined with any substantial or field interest suitable to the department. The Committee takes no view on what those should be. Furthermore, it regards the need for quantitative methodologists to be so great that expertise in any of a wide range of methods would suit the purposes of the Initiative. Together these features offer departments considerable flexibility.*

*The list below consists of departments that expressed interest to the Committee in methodological recruitments and the relevant methodological areas. It does not indicate the degree to which departments regard these positions as important or the priority they give them relative to other positions. It may not be complete. We urge interested departments to give us any further relevant information.*

- ◆ *Agricultural and Resource Economics*: cross-sectional or panel data.
- ◆ *Anthropology*: demography, evolutionary model building, statistics and simulation (sampling, Monte Carlo and bootstrapping, problematic data sets).
- ◆ *Civil and Environmental Engineering*: would be happy to see various new faculty in other units or associated with it, especially those involved with structural equations modeling, discrete choice modeling, factor analysis, longitudinal analysis, survival analysis, geographical information systems, simulation.
- ◆ *Communication*: interested in access to people able to do lag-sequence analysis, Markov modeling and time-series.
- ◆ *Economics*: (theoretical) econometrician.
- ◆ *Environmental Science and Policy*: applied spatial statistician or geographical information systems expert.
- ◆ *History*: demography, geographical information systems or cliometrics (quantitative economic historian).
- ◆ *Human and Community Development*: longitudinal data analysis (would be supported by the Medical School as well).
- ◆ *Philosophy and History and Philosophy of Science*: philosopher interested in foundations of statistical inference or quantitative methods applied, for example, to path analysis or causal modeling.
- ◆ *Political Science*: quantitative political-science methodology.
- ◆ *Psychology*: psychometrician.
- ◆ *Sociology*: demography, survey methods, network analysis, event-history analysis.
- ◆ *Statistics*: very interested in joint appointments with social science units. Mentioned especially a wide range of subjects related to econometrics and statistical demography, such as such as longitudinal analysis, multivariate techniques, survival analysis, graphically based analysis and causal modeling.

### 2.2.C. THE ROLE OF THE INITIATIVE IN THE HIRING PROCESS

In keeping with the recognition of the diversity of interests in the social sciences and the very different status of “quantitative methodology” across different disciplines, the Initiative envisages the individual departments as having primary responsibility in the hiring process. It is, however, important that the departments not lose sight of the fact that positions dedicated to the Initiative should, in the end, hire a *bona fide* quantitative methodologist.

The Committee has considered and rejected the approach that would have it or the Center Steering Committee conduct a search and then “sell” the candidate to the department. This is undesirable because it does not respect the department’s legitimate desire to direct its own development. Experience shows some departments accept candidates offered this way grudgingly – others reject them outright. It would undermine the most fundamental guiding principles of this Initiative were the candidate not fully integrated to the department.

To ensure that a person is hired who has the full support of the department and, at the same time, is a *bona fide* quantitative methodologist, we propose that the Committee or the Center Steering Committee be involved in the hiring process for each position in the following ways.

- ◆ The advertisements for the position should be written jointly between the department and the Steering Committee.
- ◆ A member of the Steering Committee should serve as the outside member on the department’s search committee.
- ◆ Campus visits and talks by prospective candidates should be publicized to the list of affiliated quantitative social scientists and an appropriate avenue for feedback about the candidates be set up between affiliates and the department.
- ◆ Before a hiring request is approved, the Chair of the Steering Committee or the Director of the Center should submit a letter to the appropriate dean evaluating the appropriateness of the candidate relative to the criteria for a quantitative methodologist.

This procedure provides departments with considerable autonomy over the choice of candidates – especially with respect to substantive disciplinary interests – while at the same time ensuring that anyone hired under the Initiative will be suitable to its purpose.

The Division of Statistics has expressed an interest in pursuing joint appointments with various departments under the Initiative. There are, of course, advantages and disadvantages of such joint appointments. The Committee believes that the procedure suggested above would permit Statistics and individual departments to negotiate such arrangements subject to the approval of the Administration.

## 2.2.D. THE ROLE OF THE CENTER IN FUTURE PERSONNEL MATTERS

The Administration should invite plans for future hiring and immediate requests for positions from the Center as from any department. The Center in cooperation with individual departments should be free to propose hiring new faculty on terms like those in Section *B* above.

## 2.3. Facilitating Intellectual Spillovers

### 2.3.A. SHARING EXPERTISE

Researchers in many disciplines, inside and outside the University, would benefit from better access to the variety of expertise on quantitative techniques available on campus. The Committee identifies at least three areas in which the Center might play a part.

- ◆ *Methodological overviews.* The Center should offer two or three times a quarter approximately two-hour-long talks that provide an introduction to the nature and purpose of particular techniques with practical illustrations of their application. Examples might include nonparametric and semiparametric regressions, Bayesian methods, survival analysis, bootstrapping and Monte Carlo methods, neural networks, the construction of survey questions, structural equations modeling, and spatial statistics.
- ◆ *Short courses.* Researchers often need to acquire expertise in a quantitative technique for which there is no available course in the University or for which they do not have the time to commit an entire quarter of classwork. The Center should offer at least once in year, probably in summer, a short course aimed at filling this gap. The course would be open to faculty, graduate students, and possibly to professionals from outside the University. A wide variety of courses might be offered. For example, courses on software, such as structural-equations modeling using programs such as LISREL or AMOS, multilevel hierarchical analysis using HLM, or courses on Gauss, S+ or other packages. Some of these courses might be given by the software vendors, others using campus resources. Other courses could focus on particular techniques. For example, on any of the topics listed under methodological overviews above or on such topics as robust regression sampling methods, or generalized additive models.
- ◆ *Lecture series.* Many departments do not regularly invite speakers on primarily methodological topics and, department seminars, while they are usually open to all comers, tend to be seen as in-house events that are often overlooked by students and faculty in other departments. The Center should, therefore, sponsor its own lecture series with the aim of keeping researchers at UC Davis in touch with cutting edge quantitative methodologies across the social sciences. Professor Colin Cameron organized a successful lecture series along these lines in Spring 1997 and Spring 1998. The Institute of Governmental Affairs (IGA) has for some time sponsored a half-day Quantitative Social Science Symposium every other year which partly

addresses the same need. What is needed is adequate funding and continuing organizational commitment, which a properly financed Center would provide.

### 2.3.B. PHYSICAL FOCAL POINT

It is often not sufficiently appreciated that architecture greatly influences social interaction. The common room is as important as the computer or the laboratory in fostering intellectual advances. The goal of the Initiative is to improve the intellectual infrastructure for the quantitative social sciences on campus. This goal requires interaction among the faculty, which, in turn, requires a literal center. It is not enough that the Administrator and staff of a Center have offices, there must be common space as well. Ideally, this would include a small meeting room, a conference room (possibly shared with some other group), and office or carrel space for visitors, and possibly Davis faculty taking sabbatical, but not leaving town. The needs are modest – but there must be a “there” there.

## **Part Three. Implementation of the Initiative**

The Initiative is conceived as an evolutionary process. Every part need not be put into place at once. Some parts can be implemented at once; some parts need further investigation and development. The Committee believes that the Center provides a structure which can evolve and adapt to a variety of needs and opportunities. We foresee all of the options. It is possible, nonetheless, as is done in Part Four below, to give a sense of some important longer-range opportunities. We propose that the Initiative be implemented in three stages.

### *Stage 1: Start Up*

a. Transitional Steering Committee. Immediately the Initiative is approved, a transitional steering committee with an interim chair should be appointed. The chair should be a quantitative social scientist in a core social science department. The Transitional Steering Committee should reflect the range and diversity of quantitative social science on campus. The purpose of the Transitional Steering Committee is to conduct a search for a permanent director and to begin searches for the quantitative methodologists described in Section 2.2 above.

b. Permanent Director. The Transitional Steering Committee should begin as soon as possible a search for a permanent director of the Center. The QSSI Committee believes that this should be a national search to secure a director who is an accomplished quantitative social scientist of the first rank – a person of breadth of vision, depth of understanding, administrative ability, and high academic visibility. The Director should be a faculty member with research and teaching responsibilities in a core social science department. If appropriate, the Director could have a joint appointment in Statistics.



While the Committee regards believes that it is essential that some of the hiring under the Initiative begin as soon as possible (and, therefore, simultaneously with the search for a Director), it recognizes that the ability of a Director to shape and guide hiring and the establishment of the Center would be important attractions for any dynamic and engaged Director. The Committee, therefore, envisages a staged development with the Director involved as soon as possible.

c. Initial New Faculty Searches. As noted in Section 2.2 above some positions envisaged under the Initiative are already well articulated and integrated closely into the associated department plans. Working with those departments, the Transitional Steering Committee should begin the search process to fill those positions.

d. Administrative Home. The Transitional Steering Committee should begin planning for the appropriate space and administrative support for the Center. Subject to the negotiation of suitable arrangements, the Institute of Governmental Affairs (IGA) has expressed a willingness to act as incubator for a new Center. The Transitional Steering Committee should further explore such arrangements with IGA and the Administration or, if it seems more appropriate, secure other arrangements for adequate space and support for the functions outlined in Sections 2.1 and 2.3 above.

e. Start-up and Continuing Budget. To get the Center and the searches for the Director and the initial faculty underway will require substantial start-up funds. The Transitional Steering Committee should work with the appropriate deans and the Provost to establish a feasible budget for the Initiative start-up and for the continuing operations of the Center.

### *Stage 2: The Center in Place*

a. Permanent Steering Committee. On appointment, the Director should take over from the Chair of the Transitional Steering Committee. At this point, with appropriate consultation, the Transitional Steering Committee should be converted into the Steering Committee of the Center (either confirming the appointments already made or making new appointments as appears desirable at the time).

b. Faculty Development. The Director and Steering Committee should begin immediately to develop in conjunction with departments and the Administration plans to hire additional faculty as envisaged in Section 2.2 above.

c. Core Program. The Director and Steering Committee should begin immediately to establish the core program of the Center as described in Section 2.3 above.

### *Stage 3: Evolving Functions*

a. Assessment and Initiation of a Survey Research Center and Outreach Activities. The Director and Steering Committee should as soon as possible begin to investigate the possibilities for a survey research center and for outreach programs as described in Sections 4.1 and 4.2 below. Both these opportunities will require substantial research to ascertain the demand for the services, the design of their delivery and their potential for enhancing quantitative social science research on campus. The Administration should budget adequate funds to conduct these investigations and, where fruitful opportunities are shown to exist, should be willing to provide adequate start-up funds to put these initiatives into place and on the path to financial self-sufficiency.

b. Social Science Computing. The Center should begin exploring the possibility of taking an active role in the improvement of social science computing as described in Section 4.3 below.

c. Improving Instruction in Quantitative Methods. The Center should begin exploring the opportunities for improving graduate and undergraduate instruction in quantitative methods – particularly in ways that advance the essential research agenda of the Initiative (see Section 4.4 below).

## **Part Four. Evolving Functions of the Center**

The following sections describe those functions of the Center that the Committee believes may constitute important and intellectually exciting directions for it to grow and develop, but which are nevertheless sufficiently separable that they are not required for the Center to be an important contributor to research in the social sciences on campus. The areas addressed do not exhaust the possibilities of future evolution. The Center is structured in a sufficiently flexible manner that other directions might also be pursued as the opportunities present themselves.

### **4.1 Survey Research Center**

Many areas of social science research rely increasingly on data collected from surveys. The ability to design, implement, and assess the results of surveys is essential to successful quantitative social science. The importance of advances in survey methodology is underlined by the recent debates in Congress and the Supreme Court over the role and validity of sampling techniques in conducting the Census. While a number of national longitudinal surveys have become a staple for social science researchers, there is increasing demand for more detailed surveys that are particularized to, say, California or some locality within it. The trajectory for survey research can only be upward. Discussions with faculty across the campus revealed considerable support for a Survey Research Center. Such a center would serve research, consultation, instructional,

outreach needs of the faculty and students on the UC Campus, as well as outreach to government agencies and the private sector. The Survey Research Center would be dedicated to quality research and to the introduction, adoption, and support of new quantitative methodologies for social science research.

The need for a Survey Research Center is suggested by the fact that many grants, and many applications for grants, require the capacity properly to articulate and conduct surveys. There is evidence that grants are lost to UC Davis researchers because of the absence of a local survey capability. While some survey work is contracted out, particularly to centers at UC Berkeley and UCLA, the absence of a local survey research center deprives social scientists at UC Davis from the kind of technical expertise and support that would allow them to compete effectively for grants. Substantial sums of money are lost to centers elsewhere. To give one example, a national sample of Asian Americans – requiring the screening of over 150,000 households in order to generate roughly 4000 interviews – would cost \$5 million, just for the fielding. And fielding costs exclude questionnaire development, investigator time, and all the activity that goes into data analysis.<sup>9</sup> But this is one extreme. At the other extreme, are the many modest surveys that may involve only a few thousand dollars or that may involve tying a few additional questions into a larger survey. A local survey research center provides leverage. It would allow students engaged in doctoral research or to faculty with relatively modest research projects to conduct state-of-the-art surveys for a small fraction of what it would take to contract the work off campus. In addition to being a convenience for all faculty engaged in survey research, a center would make the research environment at UC Davis more attractive to prospective faculty.

The Survey Research Center would provide services including:

- ◆ *Data acquisition:* study design and planning; survey sampling; data collection; instrument design and testing; mail questionnaire surveys; computer-assisted telephone and personal interviewing.
- ◆ *Data processing and management:* data entry; data coding; data cleaning; file construction and storage.
- ◆ *Data-analysis consultation and computing services:* statistical methods selection; software selection and consultation; troubleshooting; computing consultation.

The Committee envisages a fully developed Survey Research Center as an autonomous unit connected administratively to the Center for Quantitative Social Science. Such a Survey Research Center would require significant resources. The center at UC Berkeley has a permanent staff of seven. This is long-established center, offering a complex array of services. Many much smaller centers exist at a variety of institutions (some with ranked well below UC Davis in the social sciences). The Committee believes that a useful center could be started with two permanent personnel, personnel, computers, a phone bank, and adequate space to house them. This would require start-up funds and

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<sup>9</sup> Information provided by Karen S. Kurasaki, Department of Psychology and Associate Director of the National Research Center on Asian American Mental Health.

coverage of some operating overheads over, say, three years. After that time, the Survey Research Center should be continued only if it has succeeded in becoming self-financing.

In addition to the revenues raised from grants to UC Davis faculty, the Survey Research Center should offer its services to government agencies, private businesses, and other academic researchers. This would allow it to reap economies of scale and to be self-supporting. State agencies and private organizations often approach various units on campus (such as the Graduate School of Management) looking for the services that a Survey Research Center could provide. Lacking such a facility, they must be sent elsewhere. The loss to the campus is partly money, partly recognition, and partly the chance to build linkages that might generate significant research opportunities.

## 4.2 Quantitative Social Sciences Beyond the Davis Campus

Discussion with social science faculty on campus reveal a range of outreach opportunities worthy of detailed exploration. Four promising ones are:

- ◆ Promoting the services of the Survey Research Center (described in Section 4.3) to a wider community.
- ◆ Promoting the various lectures and short courses described in Section 2.3.A to a wider community.
- ◆ Developing specialized short courses in quantitative methods for people in government and industry who need to know how to apply quantitative techniques in real-world settings.
- ◆ Developing reciprocal research/consulting relationships with state agencies.

The first two opportunities are direct extensions of other functions of the Center and do not require further elaboration. The last two do.

### 4.2.A. COURSES IN QUANTITATIVE METHODS IN THE SOCIAL SCIENCE

The need for quantitative analysis is becoming ever more pressing in both private industry and government alike. Public utilities and the California government have been traditionally big consumers of statistical analysis. This trend is rapidly expanding to other areas of business (such as the banking industry) as data manipulation costs are being driven down by the computer revolution. Consequently, a high number of professionals now require high quality training in the same sophisticated quantitative techniques used by social scientists. This training, however, is currently hard to come by. Historically, the development and application of these techniques has taken place through formal courses at the University level with little spill over to common business practices.

In 1992, UC Berkeley started an Econometrics Laboratory designed to have both a research and educational outreach function. It has been successfully serving the Bay Area by offering a number of specialized workshops in state-of-the-art methods, hosting

symposia, establishing a visiting research program and developing an econometrics software archive.

The Committee believes that UC Davis is strategically positioned to serve the Sacramento area in its increasing need for training in quantitative methods applied to issues familiar to the social sciences. The Committee proposes that the Center should investigate the feasibility of establishing a laboratory similar to UC Berkeley's, although not addressed only to econometrics, but also to methods appropriate to sociology and psychology. All these areas have a natural audience with state government in Sacramento and the laboratory would help to stimulate fruitful relationships for collaborative research.<sup>10</sup>

Intensive two to five day courses could be offered during summers. As the number of quantitative methodologists increases and we establish the program's reputation, the number and variety of offerings will expand. Such course offerings would probably require additional hardware and software as well and space. Following Berkeley's experience, the Center should explore the possibility of equipment donations by local hardware manufacturers. These businesses will have in their interest that instruction be conducted with their equipment. This same principle may also affect statistical software developers who will view this laboratory as an opportunity to expand their client base. Any laboratory facility used to offer such courses could also be used for social science research during the academic year.

#### 4.2.B. RECIPROCAL RESEARCH/CONSULTING RELATIONSHIPS

A number of state agencies maintain substantial data sets of interest to social science researchers on campus. They are often looking for consulting services. While providing these services may have little academic merit in themselves, there would appear to be opportunities to develop the data and the relationship with the agency in such a way that important research opportunities could result. Two examples illustrate the type of collaborations that are possible.

First, Professors Larry Cohen and Diane Felmlee in Sociology provide a service to the California Youth Authority by providing statutory evaluations of effectiveness for various programs. This relationship provides them with access to a rich data set. Under a grant from the National Institute of Justice, they are able to conduct research in several areas. One is a longitudinal study among youth offenders that permits empirical testing of various sociological theories of recidivism. A second is a study of network effects (families, friends, etc.) as factors in youth offenses.

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<sup>10</sup> A short list of state agencies with research offices potentially in need of the services of the laboratory includes the Employment Development Department, the California Air Resources Board, the California Research Bureau, the Auditor General's Office, the Department of Health Services, the Franchise Tax Board, the California Energy Commission, and the Department of Motor Vehicles.

A second example. Professor Niels Waller provides technical advice to the California Highway Patrol by helping to analyze peace-officer selection tests – specifically, how the information from multiple psychological tests should be combined for the most effective selection of peace officers. In exchange, Waller’s laboratory receives access to a valuable data-set. They use this set as part of an effort to develop methodologies for test-scoring algorithms that can identify invalid test protocols, such as cases of misrepresentation (e.g., superlative self-reports or hiding existing psychopathology).

Establishing and managing these relationships is a time-consuming business with substantial returns to experience. There is every reason to believe that there are many more such opportunities available. A Center would provide a resource to overcome the initial start-up costs of getting such relationships off the ground. There would be substantial benefits to social-science research and to the University’s outreach mission.

### 4.3 Social Science Computing

The future of computing on campus is a vastly important issue – the subject of several past and current campus committees. The 1997-98 Provost's Advisory Committee on Information Technology (PC-FIT) recommended decentralization of computing funds. The recent allocation of one-time Instructional Equipment Replacement funds enacted such decentralization, as well as a re-orientation of funding from one emphasizing past funding levels to one that more reflected current needs. We assume that the voices of many frustrated units around the campus have been heeded, and that such changes will continue in the future. At the same time, any proposal for social science computing should recognize the past inadequacy of its support, as articulated in the PACSS report pages 22-23.

Like other units on campus, the social sciences require adequate faculty office computers, graduate student computer access (often via a graduate laboratory) and the personnel to support these, with the first of these supplied at a minimal but adequate level and the rest under-provided.

What is distinctive about the computing needs of social science research is the great use of computer laboratories, in addition to individual office computers, for larger tasks and for economies in purchase and use of the specialized software that characterizes social sciences computing. These computer laboratories are not maintained by individual faculty members. Instead they are provided as a public good, without charge to faculty, at the level of the department or several pooled departments. Little use is made of even more centralized university computing, aside from provision of the internet backbone and of university-wide computer labs for basics such as use of internet and of standard software such as Excel.

While the Committee advocates substantial improvements on all fronts, we believe that the Initiative and the Center could play a direct role only in meeting the following three additional special needs for social science computing:

1. Social sciences research computer laboratories.
2. Social sciences - wide computer laboratory for undergraduate instruction.
3. Site-licensed software coordination.

#### 4.3.A. SOCIAL SCIENCE COMPUTER LABORATORIES

A shared workstation laboratory is a key ingredient to quantitative research in the social sciences. Most prospective new faculty in quantitative social science see access to such a facility as a clear marker of the university's ability to support their research. The best analogue is the way in which prospective faculty in many physical and biological sciences must judge the university on its ability to provide an adequate laboratory. The social sciences at UC Davis greatly lag the social sciences at peer universities in their access to such facilities (see Appendix ?? below).

A major advance for social science computing at UC Davis was the establishment by the Social Sciences Data Service (SSDS) in 1989 of a laboratory to serve three departments: Economics, Political Science and Sociology. It runs Unix workstations, supported by two full-time staff. It is jointly financed by the Institute of Governmental Affairs, the Provost's Office, the Office of Research, and L&S Deans' budget, with hardware partly funded by equipment grants from the NSF. The SSDS laboratory is a success. The Department of Agriculture and Resource Economics and the Graduate School of Management also have such laboratories. The challenge is to extend similar support to the other social science departments.

We recommend that all social science departments have access to shared workstation computers. The departments not currently covered include Psychology, Anthropology, Human and Community Development and Environmental Science and Policy. Although needs are not uniform, by a simple head count, over half of social science faculty lack access to such a facility.

Given the nature of the funding mechanisms, computing needs will not be met directly out of this Initiative. The Committee nevertheless strongly advocates that SSDS be taken seriously as a model for future computing services for the social sciences. The PACSS report proposed expansion of the Social Science Computing Service to serve all social science departments, leaving open the question of where SSDS would fit in. We propose as an alternative that consideration also be given to creation of additional SSDS-like units. This has the attractions of providing less highly-centralized computing, greater flexibility in meeting the variety of demands across disciplines within the social sciences, making it easier for departments to better coordinate their own in-house laboratories to choose the optimal mix of PC's and workstations for their faculties.

A representative of the Center Steering Committee should be a member *ex officio* of the advisory committees for SSDS and any similar units. If additional units are added, the Center may play a useful coordinating role, promoting cooperation between otherwise autonomous units.

#### 4.3.B. A COMPUTER LABORATORY FOR UNDERGRADUATE INSTRUCTION

The Committee believes that most undergraduate computing will be based on (a) PCs owned by the students themselves; (b) university-wide labs administered by the Division of Information Technology; and (c) workstations accessed by students via the internet on which they might use, for example, web-browser front-ends to social science software. Examples of (c) include access to *Shazam*, provided by the Department of Agricultural and Resource Economics, and to *SAS*, provided by SSDS for the Division of Social Sciences.

Nevertheless, there will remain a need for a social sciences computer laboratory of 25-30 PCs. This laboratory would provide:

- ◆ Specific software for the social sciences.
- ◆ Specialized data sets for the social sciences.
- ◆ Assistance to students wishing to begin using such software and data.
- ◆ A site where social science students can more easily interact with each other and with their faculty than is possible when using remote login or remote computer labs.
- ◆ The ability for social scientists, through the Center, to direct an undergraduate laboratory in such a way as to meet student needs.

The Center would be well suited to direct such a laboratory. The physical support could be provided by the Division of Information Technology or by the Center.

#### 4.3.C. SITE-LICENSED SOFTWARE COORDINATION

Many of the specialized software programs used in the social sciences are used by more than one department. Currently a lack of coordination, despite attempts by budget-constrained faculty within each department, can lead to departments being unaware of discounts available due to other departments already possessing a license for the software. Such coordination is difficult, and even in the best of worlds the Division of Information Technology would find it challenging. For example, STATA is available for individual faculty PC's through a license held by the Department of Political Science, in some department lab PCs through department licenses, and through Unix machine licenses in SSDS and the Department of Agricultural and Resource Economics.

The Center should maintain a list of site-licenses for all specialized social science software. Furthermore, the Center should track the pricing policies of the individual software providers to look for additional savings that may be possible, for example, by



moving from a pooled purchase of a fixed number of licensed copies to an unlimited university-wide site license.

## 4.4. Teaching

### 4.1.A. UNDERGRADUATE TEACHING

A central goal of undergraduate education in the social sciences is to prepare students to better understand and analyze the social world around them. For many of our graduates in their jobs and for all of them in their role as citizens, understanding, assessing and making quantitative arguments is increasingly important. It is essential that students be able to understand how to use and interpret statistics. To understand the substantive conclusions of research in the social sciences requires a statistical foundation appropriately adapted to particular disciplines.

The Committee agrees with the observation of the PACSS report that centers and ORU's are the natural home for interdisciplinary research, while traditional departments more effectively deliver undergraduate instruction.<sup>11</sup> We nevertheless see important services that the Center could offer to departments that would help to advance the social sciences on the undergraduate level as a whole. While individual departments set their own requirements, the Committee proposes that the Center act to advise departments on a common standard of instruction, help to coordinate course offerings, and help to design foundational courses. We envisage all students in the social sciences having a common preparation in statistics and specialized instruction in quantitative methods suitable for their own majors. Coordination through the Center would increase efficiency in the delivery of instruction. Teachers of upper-division courses would be able to assume a level of quantitative knowledge and would not, as they so often do now, have to teach the same set of quantitative methods at the beginnings of several courses, pushing too quickly for the ill-prepared student and boring the better prepared.

The proposal has three elements:

- ◆ All social science departments are encouraged to require either Statistics 13 ("Elementary Statistics") or to offer a department introductory data analysis.
- ◆ The Center will work to cooperate with the Division of Statistics to develop a version of Statistics 13 specially oriented to the needs of students in the social sciences. An analogous version of Statistics 13 has already been developed for the biological sciences.
- ◆ All social science departments are encouraged to offer a substantive data analysis course that involves computational analysis and interpretation of data in their own discipline. These courses would differ from those offered by the Division of Statistics in that they would emphasize the contexts of the particular social science in a manner not possible except with the detailed expertise in the field.

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<sup>11</sup> PACSS, p. 14.

In addition to these proposals, the Committee notes that the Division of Statistics currently operates a minor. The Center could help to promote the effective combination of this minor with social science majors. Most social science majors allow considerable study outside the major, and it is realistic to believe that many students could take the Statistics minor, consisting of nineteen upper-division units. The key is to attract students. More introductory coursework at an early stage will help. The Center could also help by presenting once a quarter a topical seminar oriented to undergraduates.

The Committee believes that the Center should also investigate other ways in which undergraduate instruction in the quantitative social sciences could be improved. There are many courses on the books that could be taught using data-oriented approaches. Instructors who attempt to offer such courses often face daunting barriers with access to adequate computing facilities, data collection, and course management. A social science computer laboratory for undergraduate instruction (see Section 4.3.C above) would go part way to lowering these barriers. The Center would also be well placed to help facilitate data collection and exchange of pedagogical expertise relevant to data-oriented instruction in the social sciences.

Undergraduates have relatively few research opportunities. For a number of years, IGA offered undergraduate research fellowships – a small stipend to a student who would work on a faculty member’s research project in a substantive manner. This program furthered both the education of the undergraduate and the research of the faculty member. The Center could investigate reviving this program in a manner targeted to the quantitative social sciences.

#### 4.1.B. GRADUATE TEACHING

The PACSS report groups graduate education with research.<sup>12</sup> The Committee agrees that many of the functions of the Center discussed in Section 2.3 above could be open to graduate students and would significantly promote the use of quantitative methods among them. There are, however, matters particular to graduate education with respect to which the Center could play a useful part.

The object of graduate instruction in quantitative methods is to provide students in social science with good foundational training in quantitative methods and adequate opportunities to acquire specialized tools needed for their own research. Most departments provide basic courses in quantitative methods or direct their students to courses in other departments. The Committee notes, however, three areas in which the Center could play a coordinating and facilitating part.

- ◆ *Standardization of prerequisites.* It is often difficult for students in one department to understand or meet the prerequisites for courses in other departments because the same techniques are packaged differently from discipline to discipline. The Center

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<sup>12</sup> PACSS, p. 14.

could facilitate the most effective use of currently available courses by working with departments to standardize prerequisites. One possibility is that quantitative courses in all social sciences could be categorized into a three-level hierarchy: 1. no prerequisites; 2. a prerequisite of basic statistics; 3. in addition, a prerequisite of matrix algebra. This division reflects the view of the Committee that the use of matrix algebra is a substantial distinction between the basic and the advanced levels of many quantitative methods courses. Formalizing the prerequisites in this manner would permit students to readily identify the course for which they are ready and to identify the necessary background regardless of the department offering the course. Similarly, it would help instructors in those courses to know more reliably what backgrounds students bring to their courses.

- ◆ *Offer workshops in matrix algebra.* One way of meeting the prerequisites in matrix algebra is to take a quarter length course in the Mathematics Department. This is a relatively high cost to pay for the level of matrix algebra actually required for many quantitative methods courses and represents a strong disincentive to many students. To lower this hurdle, the Committee proposes that the Center offer an approximately two-week long workshop in matrix algebra each summer (and perhaps at other times according to demand). This workshop could be modeled on the successful “Math Camp” offered at the end of each summer to entering graduate students in Economics and Agricultural and Resource Economics.
- ◆ *Coordinate course offerings.* It is not uncommon for two quite similar quantitative methods course to be offered in different departments in the same quarter, but at no other quarter in the year, even when the courses are offered less frequently than yearly.<sup>13</sup> It would be more efficient to spread the offerings in a way that increased student access across the campus. The Center should monitor course offerings, advise and encourage coordination between departments, and maintain mechanisms for advertising current course offerings and future plans to interested students (e.g., by maintaining a Web site).

## **Part Five Advancing the Quantitative Social Sciences: Concluding Remarks**

Quantitative methods are an essential component of the social sciences, which are, in turn, an essential part of the university. A relatively modest investment in a coordinating Center and in, say, ten faculty based in various departments has great potential to strengthen the overall quality and reputation of the University of California at Davis.

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<sup>13</sup> An example is Sociology 207B (“Methods of Quantitative Research”) and Civil and Environmental Engineering 254 (“Discrete Choice Analysis for Travel Demand”). The courses are not identical, but have substantial overlaps in the coverage of discrete choice models. These courses well indicate the value of coordination, which would both publicize their related content and suggest to departments to avoid running them head to head.