Future Scope and Structure of the Upper Great Plains Transportation Institute:

An External Examination

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EXECUTIVE SUMMARY

Recommendations

1) A School of Transportation and Utilities should be constituted at North Dakota State University.
    a. Within the school would be the existing Upper Great Plains Transportation Institute as it is presently configured, with its multiple centers and programs, and interdisciplinary focus.
    b. A Center for Public Utility Sector Analysis should be added under the umbrella of the School of Transportation and Utilities. This center would focus on the research and service efforts in the public and private utility analysis areas.
    c. An Educational Program in Transportation, Logistics and Utilities should be developed to continue voluntary coordination of academic departmental course offerings, leading to degree/non-degree programs in all three sectors at the undergraduate and graduate levels. The Ph.D. program in Transportation and Logistics, offered in conjunction with other departments, would be a part of this program effort.
2) Development of instruction in utility issues should be the first step in expanding scope of the new School. Both academic and outreach courses should be designed to serve the state. Research and service activities would be developed as funding becomes available.
3) The course offerings should include specific training and education in energy, telecommunications and overall public utility analysis.

4) The research program and public service/outreach activities of the Center for Public Utility Sector Analysis should be developed with the advice and counsel of utility managers, administrators and regulators.
5) Funding should be sought from public and private sectors for the educational and research programs.
6) The status as a School of Transportation and Utilities is a statement of the breadth and depth of work carried on in the organization. It should be marketed to funding sources (public/private and state/national) with that strength in mind. Students (on- and off-campus) would find this area to be one of opportunity, and will self select into the area.

Specific Outcomes

1) A cadre of faculty/research staff/graduate students with expertise and exposure to the energy and telecommunication fields.
2) Baccalaureate students who have exposure, training and understanding of the utility field, especially in light-density or rural areas.
3) A library of research results to support educational and regulatory efforts.
4) An organization of multiple disciplines, academic training, and broad interests capable of participating in the issues of transportation, energy, and telecommunications development for the state of North Dakota, and in the new level of excellence for North Dakota State University.

Background

President Joseph A. Chapman has charged North Dakota State University to move to the next "level of excellence" in its service to North Dakota. The Upper Great Plains Transportation Institute (hereafter referred to as the Institute) is a full partner in that desired growth and progress. The Institute's continuing research, education, and service in transportation make it a natural partner in this move, due to the importance of all types of mobility to the state's future socioeconomic success. With the existing mission, "continue to make a significant contribution to rural and small urban transportation and logistics by attracting, developing, inspiring, and retaining exceptional people" and its vision, "enhance its reputation as one of the top university transportation centers in the United States," the Institute is poised to be a full active partner in the university's desired growth and service to the state.

Moreover, just as the mobility of people and resources is enhanced by transportation, it is also enhanced by access to reliable and affordable sources of energy and communications. Providing energy and information connectivity to rural and small urban centers is a major challenge when compared to more densely populated metropolitan centers. Efficient, reliable and competitively priced sources of energy, affordable state-of-the-art communications, along with transportation, also are necessary ingredients for socioeconomic success in the 21st century. Now, as new areas of need and service to the state occur, the Institute is considering a broader service role, including the utility fields of energy and telecommunications.

Such a potential broadening of the scope of the Institute is based on the great amount of complementarity of energy and telecommunications with the Institute's existing program in transportation. First, mobility is central to all three. Transportation provides mobility. Communications is a form of mobility (moving information), and energy is required for both

(and itself is dependent on mobility). In addition, communication and transportation can serve dual roles as complements and substitutes. Finally, all of the sectors can be characterized as "network" industries. Although the complementarities and commonalities may be evident, expansion of the Institute's scope is likely to require additional effort and focus. Thus, it is appropriate to examine the future scope and structure of the Institute as it handles this enlarged role and responds to the new charge by the University.

Approach

This external examination was achieved by utilizing various sources of information. The historical structure and growth of the Institute, with its development of various Centers in response to demands, and its current position in North Dakota State University, was first reviewed. Then the reporting structure and the programs and research/teaching areas of energy, telecommunications and public utility analysis were reviewed at other institutions and universities in the nation. Curriculum and reporting lines were compared as to subject matter and responsibility assignments. Meetings and discussions were held with North Dakota managers, administrators and regulators of utilities. From these discussions and data, inferences were drawn and recommendations developed as to the appropriate future structure of the Institute to provide the scope of teaching/research/service that will be necessary to provide needed services for the state.

Findings

Scope – The need for a broadening of the scope of the Institute to include utility fields, including energy and telecommunications, became quickly evident. Utility managers agreed that energy and telecommunications were reasonable areas of future efforts. The importance of training in, and exposure to, the utility field when accompanied by good management training was evident in all of the proposed combined sectors. In many cases, students and employees have basic engineering, management and analytical training upon graduation, but don't have the application or the understanding of the utility and transportation fields.

Commonalities exist that make joining of the teaching and research efforts in energy, communication and transportation into one entity appropriate. Commonalities include, among others, the new regulatory reform and competitive environment in which firms and managers must operate, the capacity and low-density issues of the sectors, and the right to access these services as a basic human need. Other commonalities include the high fixed cost of industries, low marginal and incremental cost nature of individual services, complexity of concurrent public and private provision of infrastructure, the current issue of unbundling of services, and the associated problem of stranded investments.

Transportation and utility sectors, as fields in the academic environment, use the disciplines of economics, engineering, business, statistics, computer science and logistics, among others. This dependence on many different disciplines is common to the three proposed sectors. The common characteristics, such as being network industries, lead to potential benefits of combining the sectors in an educational framework. This is not a new concept. Transportation and utilities have been historically and productively joined in specialized sections of various professional associations, such as the American Economics Association.

Structure – No one single academic home for these fields exists, for the reasons identified previously. The Upper Great Plains Transportation Institute is an interdisciplinary center, offering a good home for courses, programs, and research. It performs multiple roles in the state, including providing information for policymakers and managers, providing education for students at the undergraduate and graduate levels, and providing state-of-the-art research in transportation. Teaching students is performed in conjunction with the civil engineering, industrial engineering, agribusiness and applied economics, and marketing, management, and finance academic departments. With those departments, it is participating in a Ph.D. in Transportation and Logistics to serve developing needs in the state and region. It already supports "areas of emphasis" in several academic department degree programs. The consistent theme of the Institute has been transportation and logistics needs for light-density rural and small urban centers. Currently, the multi-course offerings of the Institute are presented to the University and departments as part of the research and public service activities of the Institute, with no specific state funding for such instructional efforts.

Alternative structures, ranging from fields to colleges, exist in colleges and universities. These structures are briefly defined in order of scope. **Fields** are usually a series of focused and complementary courses in an established degree program, such as the transportation field in an agribusiness program. **Programs** also are a series of focused courses in one area, such as statistics, which can result in a graduate or undergraduate degree/major/minor, but usually are offered and coordinated by several departments. **Institutes and Centers** commonly are research entities with a specific theme of research and service focus, such as a Center for Bridging the Digital Divide or the Transportation Institute, with funding arising from grantors or contracts from entities outside of the University. **Schools** are the structures that often combine research

and teaching, with some public service, into a focused area of scientific inquiry and discovery, such as Schools of Architecture or Hotel and Restaurant Management. This structure often uses several main departments, sometimes in its own control and sometimes not, but still reaches out to other departments for instructional and research academic depth. **Colleges** are broader-focused structures, including many separate departments and disciplines, but working in a more loosely connected arrangement toward a common theme, such as business or agriculture. All three elements of instruction, scholarly research, and public service characterize the successful college.

It appears that the Upper Great Plains Transportation Institute has grown beyond the traditional assignments of a center or institute. It has many centers and programs in its functions with different discipline skills and training of its faculty/staff, and has solidly reached out to state clientele with its public service and instructional activities. While heavily funded by agencies and clientele outside of the University and state legislature, it is supported by traditional state funding sources and outside industry or national supporters.

FUTURE SCOPE AND STRUCTURE OF THE UPPER GREAT PLAINS TRANSPORTATION INSTITUTE: AN EXTERNAL EXAMINATION

Background

The Upper Great Plains Transportation Institute has developed into a unique entity. Originally created as a research organization oriented toward supporting regulatory shipper efforts at the Interstate Commerce Commission and the North Dakota Public Service Commission, the Institute has broadened its mission substantially and creatively, responding to the emerging needs of a changing North Dakota and national economy. The research output of the Institute has been well accepted by its clientele, in and outside of local North Dakota economy and society. Much of the research effort has been focused on specific charges and requests of individual clients and accompanying contracts, resulting in directed and near-term pragmatic research output - research that is viewed as timely and responsive to client needs.

The expressed **mission** statement of the Institute is to "continue to make a significant contribution to rural and small urban transportation and logistics by attracting, developing, inspiring, and retaining exceptional people." The accompanying **vision** statement is to "enhance its reputation as one of the top university transportation centers in the United States." This challenge also fits directly into the message received from Dr. Joseph A. Chapman, president of North Dakota State University. He said, "Our goals…reflect the wishes of the Interim Committee on Higher Education's Report of the Roundtable. They include: Continuing to expand our efforts to define and move to the next level of excellence; Increasing NDSU's national and global reputation; increasing business and industry partnerships…" Further, President Chapman said, "These efforts will put this University in a leadership role to assist our state, region and nation move forward to the next level of excellence. The fine work of the

Upper Great Plains Transportation Institute clearly supports and complements NDSU's objectives."

Those general roundtable recommendations also lead to an imaginative examination of the scope and structure of the Institute. Paraphrased here, such a scope and structure of the Institute for the 21st century should: 1) train people and direct efforts toward the economic growth and social vitality of North Dakota, 2) provide excellence in education leading to adaptable life-long learners, contributing to our global and multicultural society, 3) develop a University System that also is adaptable and flexible in responding to changing needs of clients as they strive for a new economy in a rural state, 4) create a University System that reaches out to all students and customers in and out of the state, 5) provide a quality-based rewards system that ensures achievement of the new level of excellence, and finally, 6) sustain the vision by firming up the future characteristics of research, education, and public service needs.

Reaching out to answer the recommendations involves how to best structure the Institute to provide these services and respond to the vision. As new areas of need and service to the state arise, the Institute is determining "its new level of excellence" by considering a broader service role, specifically considering the utility fields of energy and telecommunications, and their attendant contributions to the vision within the scope of the Institute.

Such a broadening of the scope of the Institute develops because of the critical importance of utilities, especially energy and telecommunications, in the sustainable future growth of North Dakota. Such a broadening is based on a great deal of complementarity of energy and telecommunications with the Institute's existing broad program in transportation. Obviously, mobility is central to all three. Transportation provides mobility, communications is a

form of mobility (moving and accessing information) and energy is required for both (and itself is dependent on mobility).

Moreover, communication can act as a substitute for and a complement to transportation. On the one hand, e-mails and telephone calls may act as substitutes for travel, while on the other hand, such communications expand our social and professional networks to increase the desire for travel. Energy, as a partner utility to the other sectors, is heavily utilized by the transportation sector and is a provider of some of the future infrastructure, infrastructure that offers synergistic opportunities in the new telecommunications era. All three sectors also can be characterized as "network" industries – industries that serve customers at varying geographic locations through a networked infrastructure.

The overall purpose of this review is to provide information on these issues to University administrators, state clientele and state policymakers. The objectives or "terms of reference" for this report were to examine the future scope and structure of the Upper Great Plains Transportation Institute in alternative academic settings within North Dakota State University. Contributing objectives were to review functions; roles; structures and components of projects; programs; centers; institutes; schools and colleges within NDSU, and other relevant institutions as to instruction, research and public service/outreach. Finally, objectives were to review the goals and assignments of alternative structures, evaluate the appropriate policy issues/research and disciplines to be incorporated into the final academic structure, and to develop recommendations from an evaluation report of the findings.

Approach

This external examination was achieved by utilizing various sources of information. The historical structure, growth, and functions performed by the Institute, with its responsive

development of various Centers and Programs in response to state demands, and its current position within North Dakota State University was first reviewed. Then the reporting structure, programs and research/teaching areas of energy, telecommunications and general public utility analysis were reviewed at other institutions and universities in the United States. Curriculum and reporting lines/assignments were compared as to subject matter and responsibility. Particular attention was given to University Centers that dealt with public utility education, whether it was energy, telecommunications or both. Various universities with quite different programs, or areas of emphasis, were examined in some detail.

Meetings and discussions were held with North Dakota and regional managers, administrators, and regulators of utilities as to needs and productive opportunities in the utility industries. From these discussions and data, inferences were drawn and recommendations developed regarding the appropriate future structure of the Institute - a structure designed to provide the scope of teaching/research/service that will be conducive to providing needed service for the state.

Findings

Scope

Institute History – Preparing for the future, for an entity like the Upper Great Plains Transportation Institute, should involve a detailed understanding of "where have we been?" and "where are we now?" The evolution of the Institute into a complex multi-centered, multi-programmed and broadly funded critical mass of education/research/public service has been continuous, maybe even dramatic. Founded in 1967 as part of NDSU (Chapter 53-33), the original activity (if not as a specific legislative charge) was to serve as a research organization oriented toward supporting regulatory shipper efforts at the Interstate Commerce Commission

and the North Dakota Public Service Commission. Through time, the Institute has developed five focused centers, a regionally acclaimed and accepted teleconference system, four programs of education and public service, and a multi-state consortium (a center of excellence for rural and intermodal transportation), which is related to its national status as a USDOT University Research Center.

A good example of the blanket of service presented to North Dakota clientele is the North Dakota Strategic Transportation Program, which emphasizes different industries through time. The current strategic analysis of manufacturing, for example, provides an economic description of the manufacturing sector, develops logistics case studies for selected North Dakota firms, provides logistics training for manufacturers/carriers, structures a student intern program, undertakes some statewide intermodal facilities evaluations, and works for state and local strategies for development. A related program, the Agricultural Transport Center, operates in cooperation with the USDA, AMS Transportation and Marketing Division to address grain and oilseed transportation and logistics issues, rail-truck-barge-intermodal issues and rail regulatory issues related to transporting agricultural products.

Technology is the core of the research program at the Advanced Traffic Analysis Center, a Center that focuses on effective decisions for small urban transportation planning, supported by state-of-the-art traffic analysis tools. Of particular importance to this review (as a potential role model and relationship for the Public Service Commission in the utility fields) is the Department of Transportation Support Center, which serves as an information gateway between the North Dakota Department of Transportation and North Dakota State University. It is designed, through financial partnerships and research efforts, to provide the NDDOT with NDSU intellectual capital to solve statewide transportation problems.

It is from the depth and breadth of expertise that needs of the state relative to utility education and research, are examined. Evolution of the Institute, and the forms of its service to the state, continue. For purposes of this review it is useful to note that the Institute's administration frames each program – whether in a center or not, as a significant area of study/effort which entails administrative responsibilities, has permanent dedicated staff, has a long-term source of funding, and whose activities are strategically planned and deemed critical to the long-run success of the Institute.

Public Utilities and Transportation – The "public interest" has been well served by service provided by public and private utilities in North Dakota. This concept of public service still remains an integral part of the business and resource structure of the state. Recent and continuing energy distribution and pricing experience restates the critical importance of this industry. The push to "cross the digital divide" for rural areas also causes policymakers and consumers consternation. Information about and education/training in these industries is at the forefront of contributions to the state's economic stabilization and/or growth. This section reviews findings as to the need for continual development of intellectual capital in each area, as well as the commonalities among the areas that make sense for the sectors to be approached by a single entity, possibly the Upper Great Plains Transportation Institute, in a new scope and structure.

The most evident commonality amongst the sectors is the new **regulative and competitive** environment in which consumers buy, and firms sell, services. The transportation industry, with all modes, from land to sea to air, has led the way in the deregulation movement. Reliance on the market instead of strict economic regulation has either caused or allowed massive restructuring within all modes of transportation. The communications industry has been

also operating in an increasingly competitive market while the regulatory constraints in the energy area are still being worked out and are evolving – with obvious consumer and producer impacts. A related characteristic is the seeming success of these competitive responses in many urban and high-density markets but increasing uncertainty in the rural, light-density markets.

All the sectors have some **capacity problems** and **low-density issues**. Rail line congestion, duplication of lines and corridors, and peak volume demand characteristics offer similar problems in the differing sectors. Similarly, the issues of cross subsidization or universal service cannot be factored out of these industries. The same policy deliberations or managerial decisions must be made in all sectors to handle such concerns.

In a related vein, the right of **access** to these basic services is a critical policy issue facing all industries in a public interest setting. This basic right and/or need, and the public policy decisions providing it, has direct implications on the managerial prerogatives and the operating costs, revenues and returns of the firm. Understanding implications of such policies for consumers, producers, and overall industry health requires creation of new knowledge, and improvement of public and private managerial expertise, via instruction or outreach. Underlying the right of access is the proven tenet that access to energy, communications and transportation on an efficient level offers access to potential economic success for the rural, light-density and small urban areas of the state.

The cost characteristics of these sectors also generate common managerial challenges and public policy concerns. The sectors are faced with a **high fixed cost, low marginal or incremental cost,** and long service lines, especially in the light-density areas. These characteristics are some initial reasons for regulation of the railroads, pipelines and telephone companies in the early years of our country. Pricing services equitably, while maintaining

profitable and high-quality service, is problematic in industries with these cost characteristics. This is particularly true in the light-density, and hence low-profitability, areas of the state.

Similarly, this area of the nation's economy and business fiber is faced with the complexity of sometimes **joint private and public provision of infrastructure**, or infrastructure that is under public control. The motor vehicles, airplanes and watercraft of our nation benefit from public provision of highways, airports and waterways, similar in some situations to the electricity and communications sectors. Under the new regulatory attitude, and parallel search for competitive benefits, these investment issues must be examined, especially in the context of the rural economic environment.

The concept of **unbundling of services** is a hot topic in the power industry. But, in some fashion the process has been underway for years in the rail and communications industries, more obviously in the communications sector. Railroads are moving away from providing rail car capacity, warehouse landings and sites, and local assembly of products (the latter by the elimination of branch lines or the creation of short lines), while the differentiation of long distance service versus local providers in the telephone industry is well known. While the differing firms might not think in these terms, they all are involved in coordinating retail, distribution, wholesale and production of services in order to serve customers.

The issues highlighted previously provide a small sample of the commonalities among transportation, energy, and communications. Moreover, such issues do not even mention the commonality of skills needed by practitioners in the three fields. Such skills include, but are not limited to, an understanding of networked industries; an understanding of economic regulation; an understanding of industry and service costs; an understanding of public and private costs; strong analytical skills; quantitative skills and technical skills. These commonalities in issues

and skills seem to make the combination of the three areas a natural fit in teaching, research, and service.

Public Utility Programs – A review of Universities offering utility education programs or research efforts did not identify any that dealt specifically with the issues relevant to light density or rural areas. A brief review of some of the existing institutes/programs as to focus and curriculum is useful.

Columbia University

The Columbia Institute for Tele-Information (CITI) coordinates with the business school at Columbia University to provide graduate education related to communications. The business school provides MBA concentration in Media, Entertainment, and Communications. Although much of the course material is specific to the broadcasting and entertainment industries, several courses would be useful for a program in energy and communications. Some of these include:

- International Communications and Media Networks
- Managing Innovation
- Intellectual Property in a Network Economy
- Information Technology Strategy and E-Commerce
- Technology Management

Courses also can be taken in other areas as part of the concentration. Some other possible courses include:

- Engineering:

  Broadband Networks, Computer-Communications Networks, Communications and Networking, Wireless and Mobile Networking

- Public Affairs:

  Global Communications and World Affairs, Telecommunications Management

- Law:

  Technological Properties, Telecommunications Law

While the Columbia program is not officially an interdisciplinary program, it appears that an interdisciplinary degree in this area could be offered with many of these same courses.

University of Florida

The University of Florida's Public Utility Research Center's researchers teach courses at the graduate and undergraduate level in Public Utility Economics, Information and Incentives, and Strategy in Evolving Infrastructure Industries. They do not offer a degree or specialization in energy and communications, but appear to have a significant number of courses in their Business College that would be useful for such a program. Some of these include:

- Strategic Costing
- Financial Reporting and Auditing for Specialized Industries
- Legal Aspects of Technology Management
- Antitrust Policy and Managerial Decisions
- Social Regulation and the Firm
- Strategies for Deregulated Industries
- Economics for Managing Information in Electronic Commerce
- Industrial Organization and Social Control
- Regulatory Principles
- Business Telecom Strategy and Applications

There are many other courses, not specific to utilities, offered by the University of Florida Business College that would be useful in such a program.

University of Maryland

The Department of Logistics, Business and Public Policy in the Robert H. Smith School of Business offers courses in the areas of logistics, transportation, international business, managerial economics and public policy, business law, business ethics, and telecommunications policy and economics. The LBPP faculty has taken a leading role in the development of cross-functional MBA concentrations in logistics/supply chain management, international business, and global business and knowledge management, and teaches courses in the MBA concentrations in business telecommunications and electronic commerce.

New Mexico State University

The Center for Public Utilities coordinates with the College of Business and Economics to offer a Master of Arts in Economics with a specialization in Regulatory Economics. The course work examines several aspects of the energy and telecommunications industries, such as cost analysis, pricing, and dealing with economic regulation. Required courses for this program include:

- Microeconomic Theory
- Macroeconomic Theory
- Econometrics
- Public Utilities Regulation
- Mathematical Economics
- Antitrust Policy and Monopoly Power

- Advanced Public Utilities Regulation I and II
- An Accounting Course
- A Finance Course
- Internship

Some of these courses also can be used for a concentration in Regulatory Economics with the MBA program.

University of Wisconsin

A Public Utilities option is offered in the UW-Madison School of Business. The curriculum includes the following:

Required Courses:

- Bus 470 Public Utilities
- Bus 471 Public Utility Problems

Plus two of the following:

- Bus 350 Managerial Economics
- Bus 512 Corporation Finance
- Econ 352 Role of Government in the Economy
- Econ 461 Structure of American Industry

Recommended Electives:

- Bus 376 Operations Research for Management
- Bus 552 Residential Finance and Housing Policy
- Econ 301 Intermediate Microeconomic Theory
- Econ 343 Environmental Economics
- Econ 440 Urban and Regional Economics

- Geog 312 Regional Development and Planning
- Poli Sci 420 Administrative Law
- Urb R Pl 449 Government and Natural Resources

University of Wyoming

The University of Wyoming's Public Utility Training Institute, housed in the Department of Economics and Finance in the College of Business, offers a specialization in Industrial Organization and Regulation for Master's Level and Ph.D. students in Economics. The specialization includes three courses:

- Advanced Industrial Organization and Public Policy
- Advanced Public Utility Economics
- Seminar in Regulatory Economics

The program attempts to train students in current problems in regulated industries.

In addition there are some Universities that perform research related to utilities/network industries, but do not offer degree programs.

Michigan State University

The Institute of Public Utilities (IPU) is a not-for-profit, independent research organization at Michigan State University. It is affiliated with the College of Communication Arts and Sciences and the MSU-Detroit College of Law and the Eli Broad Graduate School of Management. Some of IPU's activities include:

- Multi-disciplinary research
- Economics, political science, communications, engineering

- Education programs for industry and government, addressing market structures regulatory practices, and public policies – ongoing educational programs for the public sector, current issues seminars, and specialized, on-demand education programs
- Research in infrastructure policy, regulatory instruments and institutions, and industrial organization
- Visiting scholar program – visiting scholars perform research at IPU

The IPU is funded by utility and communications firms membership dues, public and private research grants, and program and publication revenues.

National Regulatory Research Institute - Ohio State University

- The NRRI performs research, technical assistance, workshops, and conferences related to regulatory policy. Their primary clientele are state public utility regulatory commissions. Some of their activities include:
    - Research and service related to regulatory policy
    - Technical assistance – responds to information requests and provides assistance to state public utility commissions
    - Short research reports on topics of immediate interest to NARUC member states
    - Contract research for specific regulatory problems – state, federal, outside U.S. governments
    - Two-day, small-group, training for new public utility commissioners
    - Workshops and training
    - Quarterly newsletter to NARUC members
    - Conferences

In summary, the previous programs offer insight into potential useful course content for a new Master's level program in energy and telecommunications and corresponding undergraduate areas of emphasis at North Dakota State University. However, it does not appear that any of the programs encompass the full multi-disciplinary approach envisioned for NDSU, nor do they address problems unique to energy and communications industries operating in small urban and low-density rural areas.

It is important that any new program aimed at educating students for potential careers in the energy and communications industries be responsive to the true needs of businesses and government agencies with oversight responsibilities for such industries. Thus, such an educational program should be developed under the direction of a steering committee with representation from industry participants, government, and academia.

Structure

Many alternative structures exist in many different universities and many of these have similar functions and intellectual products. Many universities were examined via discussions, catalogs, websites and academic literature. This examination revealed that each university develops a structure common to and acceptable in its own culture. Yet some general themes and functions for some general focus structures can be identified. Again, each individual and each institution may, and probably should have, its own definitions or interpretations.

Alternative structures come in many shapes and sizes. But **Centers and Institutes** are commonly research entities, with a specific theme of research and service focus, that are independent and interdisciplinary in nature. The names of various NDSU Centers and Institutes reflect such individual focus: Center for Business and Consumer Research, Institute for Natural Resources and Economic Development, Northern Plains Policy and Trade Research Center, the

North Dakota Institute for Regional Studies, the North Dakota Water Resources Research Institute, etc. Some are grant-driven, some are endowed, and some are legislatively mandated.

Programs often are found within a center or college. They commonly consist of a series of focused courses in one area, such as statistics, which can result in a graduate or undergraduate degree/major/minor. Programs are often oriented toward the academic teaching side of the educational endeavor, but also can have a research focus. Similarly, but at a more micro-level, **fields** usually are a series of focused and complementary courses in an established degree program, such as the successful transportation field in the agribusiness program at NDSU.

Schools are entities that can operate much like a college but without their own academic departments. Schools are structures that often combine research and teaching, with some public service or outreach, into a focused area of scientific inquiry and discovery, such as Schools of Architecture, Construction Management, Hotel-Restaurant Administration, etc. Schools often utilize and coordinate with several departments, sometimes in their control but usually not, reaching out to other departments for instructional and research academic depth. Schools appear to often not have individual overall funding but rely on the funding/grants of the entities in the structure.

Finally, **Colleges** are broader focused structures, including many separate departments and disciplines, but working in a more loosely connected arrangement towards a common theme, such as business or agriculture. They often have state or institutional funding by which they service and support the individual academic departments.

It thus appears that the Upper Great Plains Transportation Institute has grown beyond the traditional assignments of a center or institute. It has numerous centers and programs within its

jurisdiction and functions, it has differing discipline skills and training on its faculty/staff, and it has reached heavily out to state clientele with its public service and instructional activities. While funded modestly from state resources, it has achieved substantial funding from agencies and clientele outside of the University, both industry and national in nature. It is offering a full complement of teaching, research and public service, As the scope of the Upper Great Plains Transportation Institute continues to expand, to utilities or other areas, the structure must evolve to provide the requisite flexibility for full service to the state.