Report to
The National Science Foundation

WORKSHOP TO IDENTIFY NEW MEASURES OF UNIVERSITY CONTRIBUTIONS TO REGIONAL ECONOMIC GROWTH

Award #1000492

Prepared by
Association of Public and Land-grant Universities

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ASSOCIATION OF
PUBLIC AND
LAND-GRANT
UNIVERSITIES

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Executive Summary

On February 25, 2010, the Association of Public and Land-grant Universities (A·P·L·U) held a workshop to identify potential new measures of university contributions to regional economies. The workshop conducted under the auspices of A·P·L·U's Commission on Innovation, Competitiveness and Economic Prosperity (CICEP), with generous support from the National Science Foundation Division of Science Resource Statistics. The ultimate goal of the event was to identify 4-6 potential new indicators that NSF could further examine and validate for possible inclusion in its Higher Education Research and Development (HERD) Survey.

The A·P·L·U Metrics Workshop was designed to bring together a wide range of perspectives on how to more effectively measure the range of university contributions to regional economies. Participants included individuals from universities, government, non-profit organizations, the media and private sector. The proceedings were structured around three concurrent discussion sessions focusing on Linkages and Partnerships, Entrepreneurship and Human Capital. Each discussion group developed its own set of recommendations, but there was regrettably not enough time left in the day to develop a final set of specific potential indicators to recommend to NSF.

However, the workshop was a significant success in terms of creating a unique forum where a wealth of information and ideas surfaced and were explored in some depth. Further, the discussion produced clear consensus that several categories of potential measures are worth deeper exploration and consideration by NSF, including:

- Human Engagement: tracking the activities of university faculty, staff and students and individuals from the external community in various types of engagements – paid and unpaid – as an indicator of contribution (university personnel outward) and perceived value (external community inward)

- Investments: cash investments by universities and external funders (industry, government, foundations) in economic growth and innovation activities with university investments serve as an indicator of commitment or engagement, and external contributions indicating support and recognition of the institution's value to the economy.

Subsequent to the workshop, NSF requested that A·P·L·U develop a more specific, prioritized list of potential new measures. Accordingly, A·P·L·U created a web-based survey comprised of all of the potential indicators that could be identified from the workshop discussion notes and input from the discussion moderators. The survey was sent to all workshop participants and generated a 71% response rate. The five highest scoring potential indicators include:

- Progress over time of companies started with university IP (investment capital raised; payroll taxes paid; new markets accessed)
- Faculty/staff consulting with industry (compensated and uncompensated) with a focus on consulting that is of developmental assistance to firms

- Alumni employment paths/progress (using social media data to track such data elements as employment of graduates in region; size of firm; job position)

- University investments in technology transfer/commercialization operations

- Impacts on industry of university research, technical or technological assistance

The complete survey results are provided in Attachment A.

In addition, A·P·L·U strongly urges the National Science Foundation to consider several additional factors regarding the measurement of university contributions to regional economies as it moves forward in refining and validating these recommended metrics and other indicators, including:

- Institutional context: the roles and missions of a particular institution and how the role and mission impact the institution's approach to and level of economic engagement.

- Environmental or external context: what circumstances exist outside the university that will influence, if not govern, how the institution engages with its regional economy.

- Ratios that normalize data across institutions: to enhance the ability of data end-users to make meaningful comparisons between large and smaller research universities, or even between specific research programs within universities.

- Self-Reporting systems and other analytical tools: metrics used to track and understand the impacts of the university sector on regional economies must make use of data stored in the diverse array of both public and proprietary centralized databases

- Tracking business performance data: identifying new data that would assess the effect of university support—in the form of technical assistance, investments, or technology transfer support---on subsequent business outcomes such as job creation or increases in revenue.

A·P·L·U and members of both the data generator and data user community are eager to continue the effort to identify and examine potential new indicators of university impacts on regional economic growth.   A·P·L·U strongly encourages NSF and other appropriate departments and agencies within the Obama Administration to devote additional time, energy and resources to continue this important discussion drawing on the various efforts underway in this field.

WORKSHOP OVERVIEW

This report summarizes the planning, implementation and outcomes of the workshop to identify potential new measures of university contributions to regional economies held, Feb. 25, 2010, in Washington, DC. The meeting was organized by the Association of Public and Land-grant Universities (A·P·L·U), under the auspices of its Commission on Innovation, Competitiveness and Economic Prosperity (CICEP), with generous support from the National Science Foundation, Division of Science Resource Statistics. (Award #1000492). (See Attachment B for the CICEP Executive Committee Roster)

The workshop was designed to advance the identification of measures that more completely capture the contributions of universities to regional innovation, beyond traditional economic impact metrics. More specifically, participants sought to identify a set of potential new measures to recommend to the National Science Foundation (NSF) that:

> o   contribute to our understanding of the role of universities in regional economic growth through such activities as technology licensing, university contributions to creating and sustaining new and existing business, and the transfer of human capital between universities and industry,

> o   lend themselves to statistically meaningful national characterizations (i.e., are not anecdotal or institution/region specific), and

> o   can be collected from academic institutions (and do not, for example, depend on data collections from local businesses)

These criteria were defined by NSF/SRS based on the participation of several SRS program staff in a metrics-related discussion at the recent 2009 A·P·L·U Annual Meeting.

The workshop discussion was structured in two parts: 1) identifying potential metrics that meet the NSF criteria outlined above; and 2) determining the feasibility (logistical/economic/political) of identifying, collecting and publishing data relevant to the proposed metric. This report contains recommendations of measures that deserve further testing and validation. We are hopeful that other organizations will also consider the potential usefulness of the recommended metrics.

Participants in the workshop included representatives from a wide range of data user and data generator communities, including government (elected and career) officials, foundation officers, media and industry representatives, and university personnel. Participants were identified through a consultative process managed by A·P·L·U which solicited recommendations from individuals and organizations across the broad range of data users and generators. Invitations were issued by Peter McPherson, A·P·L·U president, and Jack Wilson, president of the, University of Massachusetts and Chairman of the Commission on Innovation, Competitiveness and Economic Prosperity. In the end, workshop participants included representatives from the following sectors:

Academic scholars
Federal research agencies
Federal economic development agencies
Higher education associations
Industry
Journalists
Non-profit policy/research organizations
Non-profit economic development organizations
Non-profit foundations
State/regional economic development agencies
State government organizations
University technology transfer
University economic development
University institutional research
University administrators

(See Attachment C for a complete list of participants.)

WORKSHOP DISCUSSION

The workshop was divided into two discussion blocks to elicit the broadest range of potential new measures, as well as to identify specific metrics to recommend to the NSF for further investigation. In an effort to ensure the productive outcome, A·P·L·U developed and circulated a white paper that provided the context for the workshop and suggested focus areas for discussion.   (See Attachment D) The workshop attendees were specifically asked to provide suggestions of additional categories of metrics. In addition, the attendees were provided a "Participant Guide" to assist in the discussion. (See Attachment E)

Ultimately, the workshop was organized around three discussion groups, each focused on a different metrics category:
  ° **Linkages and Partnerships:** Elizabeth Hoffman, Iowa State University, Moderator
  ° **Entrepreneurial Activity:** Jack Wilson, University of Massachusetts, Moderator
  ° **Human Capital Transfer:**, Luis Proenza, University of Akron, Moderator

A·P·L·U made every effort to ensure the discussion groups included perspectives from each sector represented among the participants. (See Attachment F for rosters of the three discussion groups.)

The discussion within each group was extensive, thorough and thoughtful. While there were variations across the groups, they all generally used the two hour time block before lunch to explore the widest possible range of issues concerning university contributions to regional economies, identifying numerous issues and providing content that should be pursued in the future. The afternoon session was devoted primarily to focusing on specific metrics that each group felt the NSF should investigate in more depth, as outlined in the Recommendations section. (See Attachment G for the "Facilitator Guide")

Linkages and Partnerships Group

The group had a rich discussion of the investments other entities are making in universities to demonstrate the wide range of partnerships possible between communities and universities. Going a step further, the breakout discussed the importance of identifying individuals' efforts and activities in their communities and how those actions are already or could be measured. Discussants noted that relationships are quite variable, sometimes based on proximity (e.g., University of Memphis/FEDEX); sometimes on relationships among individuals; and sometimes on the expertise that exists at a certain university (e.g., life sciences research at the University of Utah).

The difficulty of measuring across a multitude of definitions and university policies became evident immediately. The group spent time discussing how data that is already available could help provide context to better understand the different types of linkages and partnerships that are appropriate or necessary for a given institution. The kind of data that could serve as an indicator of a university's economic impact includes:

- housing/business occupancy rates;
- employment rates;
- phone call/email data; and
- alumni data through their social media networks

It was noted that high-end jobs drive service jobs; this is the current focus of the Chinese government as it follows the U.S. model. Some discussion on future data needs from five to 20 years out – was mentioned: what are the metrics that provide the information we will need? And, are we looking at the right things?

Entrepreneurial Activity Group

The Entrepreneurial Activity group engaged in a broad-ranging discussion, which began with a general consensus that existing tools and areas of emphasis are inadequate to describe the role of universities in spurring economic activity. Examples shared from different regions and sectors illustrated a more robust picture could be painted of impacts created from academic research and related programs.

One key element is to move beyond a simplistic focus on university outputs, such as counting patents or the creation of new companies, or the commercialization of university intellectual property. A favored approach focused on longer-term impacts and the ability of university research and programs to contribute to sustained company success over time, measured in ways such as:

- investment capital raised;
- payroll taxes paid (an indication of job creation and maintenance); and
- new markets accessed.

Similarly, there was significant discussion about the importance of broadening the focus beyond licensing technologies to direct, measurable university activities related to economic

engagement. An assessment of the catalytic role played by academic institutions to support entrepreneurism could reasonably include:

- industry-sponsored research;
- consulting activities of faculty;
- access by companies to unique facilities and equipment;
- university-managed seed investment programs; and
- education and training activities that improve human capital.

Human Capital Transfer Group

The conversation in the Human Capital Transfer session was free-flowing and creative. The participants' diverse roles and perspectives were valuable and the conversation quickly moved beyond traditional ways of thinking about and measuring human capital transfer – e.g., the number of students who earn degrees.

Human capital transfer is about the movement of knowledge and skills and the group spent some time identifying the potential groups whose movements could be tracked. The discussion began with the typical university groups - faculty and students - and then expanded. Participants agreed that students should not be limited to the "first-time, full-time undergraduate" population but should include all students – undergraduates, graduate students, continuing education students, professionals returning for additional training, citizens who use extension services, etc. Other key groups to include are alumni, administrators, and other university staff.

The group also agreed that human capital transfer should not be characterized as a one-way transfer from the university outward but as a two-way interaction between the institution and the community. And the community was not limited by geography and could be local, regional, state, national, and global in scope, although for state universities, the relationship between the institution and the state was recognized as being of paramount importance. Also mentioned as critically important was the communication and exchange between industry and institutions. Examples were given of the ways interaction with industry could be formalized – in both the teaching/learning and research areas. Neither industry nor the university has a complete view of the world, but the different perspectives could potentially be helpful for both parties in building partnerships.

RECOMMENDATIONS

At the conclusion of the afternoon discussion session, each breakout moderator reported their preliminary recommendations to the entire group. Not surprisingly, the recommendations covered a range of issues and ideas as each discussion group approached the measurement task from different perspectives (i.e., linkages, entrepreneurial activity, and human capital transfer). (See Attachment H for preliminary recommendations from each breakout group.)

What is most striking – and perhaps of most value to NSF – is there were several significant areas of commonality among the breakout groups. The similarities suggest these areas are most

deserving of NSF's attention as it works to develop new survey questions for the Higher Education Research and Development (HERD) Survey. These common recommendations include the following:

Human Engagement: All three groups concluded, to one degree or another, that capturing the engagement of university personnel (faculty, staff, students) in external activities – as well as the participation of external constituents in internal university programs and functions – could be a useful measure of contributions by or the perceived value of the institution to its community. The nature and extent of these connections is important to understand for several reasons. First, universities no longer "own" the educational space. Individuals have numerous options to gain the knowledge, skills and credentials necessary to be successful in the global economy. In addition, while patents, licenses, publications and other transactions are readily identifiable and "countable," the vast majority of technology transfer results from the person-to-person exchange of ideas and information that occurs through individuals moving between universities and industry and among companies.

The external linkages could include faculty and staff consulting with industry or other public and private sector entities – including paid consulting, unpaid participation on boards and commissions, etc. Student participation in the community could range from formal internships or coop opportunities to service learning or other public service activities. The workshop participants expect a sizeable amount of this information is captured by individual institutions, but not necessarily through a central mechanism. Engagement within the university by community members could include service on advisory boards, as adjunct faculty or mentors.

For example, at some universities student service learning/public service hours are collected by the student affairs or service learning office, but that practice is not uniform across all higher education institutions. Similarly, faculty are increasingly required to provide information regarding their consulting activities. However, that information is generally not publicly released, nor aggregated anywhere on campus in a format easily analyzed. In addition, faculty consulting can be a politically sensitive issue at some institutions and in some jurisdictions, so NSF is encouraged to explore this particular area carefully and thoroughly. As well, data on participation by external individuals in university activities may be scattered across a campus and be difficult to compile. Universities would need to understand the value of the data prior to providing the data.

Despite these obvious challenges, the workshop participants felt strongly that engaging individuals, both inside and outside of the university, is evidence of a university actively participating in and being valued by the community where it resides or operates. While the direct economic benefit of these activities is difficult to calculate, they could serve as a significant marker for university contributions to a region. NSF is strongly encouraged to thoroughly investigate these possible elements and at the same time, determine how to characterize this data so it is more than merely a head count.

In addition, measures of university impacts on human capital based on educational training and certification, career progression, and geographic location are already feasible and should be part of standard measures of institutional contributions to regional economies. However, the

emerging near ubiquity of participation in self populated social networking sites (e.g., LinkedIn) that catalog continuously updated career and education information, combined with the clear capability to access profile data that is already collected by federal grant programs (such as NSF investigator profiles), provides a rich source of highly granular self reported data that could be an additional component of university impact measures. While developing systems that aggregate, integrate and provide access to this data is not trivial, it is highly doable and already exists to varying degrees in other domains (e.g., affiliations and connections of officers of publicly held companies). Data integration already being collected such as NSF and the National Institutes of Health (NIH) investigator profiles, public data on economic activity and private data from sources such as Dun & Bradstreet and online social networks would create a much clearer, comparative and objective picture of economic impacts and networks that support economic development. A·P·L·U urges NSF to explore the potential of incorporating information from these existing and emerging data sets into new measures of university impacts on regional economies.

Investments: Investment of money, by universities or by industry and other external funders, could serve as another measure of an institution's contributions to the region. This measure could take a number of different forms including: university investments in "commercialization" activity (e.g., licensing statutory protection of intellectual property activity including support of Technology Transfer/Technology Licensing Office operations; internal funds provided for proof-of-concept activity; capital contributions to start-up companies; funding of entrepreneurial activity – courses, training, competitions) and industry support for activities at the university (e.g., contract research, joint ventures, contracting for use of facilities/equipment). A number of these types of investments are captured in the framework recently developed by the University of Glasgow in response to the United Kingdom Research council requirement that research universities measure the value of the public funding they receive for research and commercialization activities. (See Attachment I) While not all of the Glasgow criteria and categories may be applicable to or appropriate for U.S. institutions, NSF might find some of those measures worth exploring. A·P·L·U, in conjunction with the other higher education associations focusing on metrics, is prepared to work with the NSF to identify the most relevant and appropriate investment measures for further exploration.

<p style="text-align:center">*   *   *   *</p>

As NSF explores the efficacy and relevance of measures related to university contributions to the economy, there are several important "framing" elements that also must be considered. The first is the issue of <u>institutional context</u>. In the area of economic engagement, it is important for any data user to have a basic understanding of the roles and missions of a particular institution and how the role and mission impact the institution's approach to and level of economic engagement. For example, a research university with a history of industry partnerships and a funding portfolio that reaches into the hundreds of millions of dollars will most likely have a different approach to economic engagement – and corresponding different looking data - than a smaller regional institution with research funding in the tens of millions of dollars in a region with a limited industrial base or access to venture capital. Similarly, an urban serving institution with a long history of community engagement and a strong tradition of student service learning will have data differing from both of the other institutions. None of these approaches is inherently good or

bad, as the needs and capabilities of a community, as well as those of the "local" institution, are different.

Similarly, there is the issue of environmental or external context, namely, what circumstances exist outside the university that will influence, if not govern, how the institution engages with its regional economy. For example, some locales may have a solid workforce base while in other locations workforce development might be a pressing need. Consequently, measurements focusing on education/training/skills development could differ significantly between like institutions operating in different environments. Further, the economic needs of a community will change over time which also impacts the types and intensity of specific contributions an institution strives to make in that region.

While it is the responsibility of each institution to define and explain its role in economic engagement and set the context for the data that is presented in the NSF HERD Survey – or any other instrument – A·P·L·U encourages NSF to consider structuring how economic contribution data is presented to indicate the importance of both the institutional and environmental context of individual universities. In addition, NSF should carefully consider what data it attempts to collect in light of these contextual issues. Some approaches to metrics include considering goals or priorities of the institution/community, and reporting data accordingly. In addition, impact to the community may not be understood for many years after initial investment or activity, yet the causal information is lacking to demonstrate impact. Without causal data, one cannot know the relative impact of a patent filed in 1999 or free consulting provided in 2004.

In a similar vein, simple reporting of economic contribution measures will present a false picture of an institution's "value" or "level of effort" in the absence of some type of ratios that normalize the data across institutions. The more-is-better logic of university engagement is flawed because in the absence of normalized output measures, it is difficult to make meaningful comparisons between large and smaller research universities, or even between specific research programs within universities. If research productivity is equal, why should a university spending more money for research be ranked higher than one spending less? Some universities have much larger rates of patenting and commercialization than those with comparable research budgets, and all surveys that assess patenting and commercialization ratios expressed as a fraction of research income show no correlation, especially when scaled.[1]

At present, no established frameworks exist to calibrate the respective contributions of individual institutions to their regional economies. The revisions to the HERD Survey currently being considered by NSF provide an excellent opportunity to develop a framework that characterizes institutional diversity and demonstrates university productivity in a way that is understandable, effective and covers the broad spectrum of U.S. institutions. For example, the annual surveys from the Association of University Technology Managers (AUTM) scale productivity by output per million dollars of research activity. The investment and human capital metrics suggested above could easily be reported in a similar fashion, once a suitable "normalizing" denominator is identified and validated.

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[1] Based on Proenza, Luis M. "Beyond research rankings" Luis M. Proenza, Inside Higher Education, http://www.insidehighered.com/views/2007/05/17/proenza. 2007, May 17.

ADDITIONAL ISSUES

Within the discussion groups a number of important issues were raised that should continue to be explored both within the community of interested parties and with key agencies and officials. These issues include:

Self-Reporting Systems and Other Analytical Tools

As more and more data on university activity is stored in a diverse array of both public and proprietary centralized databases it is imperative that metrics used to track and understand the impacts of the university sector on regional economies keep up. There are a number of important benefits to including such sources as self reported information from NSF Principal Investigator profiles, online social network profiles and other sources, as well as information aggregated from proprietary sources such as business data providers – Dun and Bradstreet for example. Because this information is updated in real time, it is likely to be more accurate as it draws from sources rich in detail. Further, this data can be more granular and does not require the participation of the university sector to gather or report. As a result the depth, richness and objectivity of data could be improved while the reporting burden on universities is not increased and could, perhaps, even be decreased.

The private sector actively uses analytics of this type to understand complex system interactions. These techniques conceivably could be applied to better understand how the significant amounts of public funding that the university sector receives benefits society. With appropriate privacy safeguards, transparency of methods, and reporting mechanisms enabling broad public access to the analytics and insights generated, substantial benefits to society and to decision makers at every level are possible.

Another form of analytics that might prove useful is methods to track Internet-based interactions and other communications data among universities, their communities and individual or groups of partners. For example, could communications data, web site hits, etc. indicate how communications are occurring within a cluster and could comparisons of communications patterns within an established cluster and an emerging cluster indicate what might be missing in the less-established cluster. This is an emerging area that would require further study to determine its potential usefulness and efficacy as a measure of university contributions to an economic region.

Tracking Business Performance Data

Some meeting participants felt that data sources place too much emphasis on university inputs or activity measures. While these measures are helpful, they do not provide much insight into the ultimate business and community impacts of various institutional interventions. It was suggested that new sets of measures related to business performance also be considered. This new data would seek to assess the effect of university support—in the form of technical assistance, investments, or technology transfer support---on subsequent business outcomes such as job

creation or increases in revenue. The data could be collected via surveys of firms receiving formal assistance from the university, with firms being asked to respond to a standardized set of questions on program impacts. These results would provide useful insights into how businesses are benefiting (or not) from key university partnerships.

Providing a Public Good

While it is not clear exactly how to measure it, there is a significant amount of "public good" that universities create in the community, state, or region in which they reside. Part of this public good is in the form of the university as an employer issuing paychecks to individuals who, in turn, put money into the economy; another aspect is university contracting with local vendors and suppliers that provide services and equipment to the institution. Additionally, there are athletic, cultural and fine arts activities (sporting events, concerts, exhibits, theater performances, etc.) that provide the community with entertainment and educational opportunities that might not otherwise occur without the presence of a university, but that are difficult to value. Perhaps most important is the public good created through the involvement of university administration, faculty and staff in community decision making processes, whether with the government, business and/or industrial sectors, that might not otherwise occur without the university engaged in the community, state or region. Related to this last concept is the essential role of human capital in the effectiveness of the innovation ecosystem. Therefore, a serious academic approach to the concept of talent supply chain management is needed and, given that the economic impact of human capital is presumed to be quite large, this endeavor could facilitate the formulation of new tools to quantify the worth and investment value of intangibles in the economy.

CONCLUSION

Based on comments A·P·L·U received during and since the workshop, there is strong – even intense – interest in continuing to explore these and the other issues highlighted in this report in a thoughtful and systematic manner. A·P·L·U, along with other organizations focused on these issues, is eager to continue working with NSF to identify and validate specific metrics in the two categories noted above. A·P·L·U and a number of the workshop participants feel strongly that additional forums need to be created to continue discussion on the broad range of topics raised during the workshop. Several of the overarching issues are noted earlier in this report (the significant potential of the Internet to harvest data relevant to the economic contributions of universities; the "public good" contributions of universities; the potential value of end-user surveys), but those barely scratch the surface of the topics raised during the workshop, or that would be raised in additional forums. In addition, several organizations are continuing to move forward with efforts to identify and implement new measures of university contributions.

For example, A·P·L·U has recently released an Institutional Self-Assessment Tool (See Attachment J) designed to help universities evaluate their programs and practices toward regional economic engagement. One potential outgrowth is the identification of new metrics developed by individual institutions to track and measure the success and progress of their activities. In addition, the A·P·L·U CICEP Metrics Working Group, which helped to organize the Metrics Workshop, plans to use the outcomes of the workshop as the basis of an initiative to

identify potential data sources that could populate some of the metrics identified during the workshop. In addition, AUTM has recently begun to develop a new survey which will collect data across a broad array of a university's activities related to economic engagement.

ATTACHMENT A

Survey of A·P·L·U Metrics Workshop Participants
compiled 5.11.2010

32 of 45 (71.1%) participants completed survey

Potential New Measures of University Contributions to Regional Economies
(Please select up to 5 indicators)

Answer Options	Response Percent	Response Count
Progress over time of companies started with university IP (investment capital raised; payroll taxes paid; new markets accessed)	59.4%	19
Faculty/staff consulting with industry (compensated and uncompensated) Note: focus on consulting that is of developmental assistance to firms	50.0%	16
Alumni employment paths/progress (using social media data to track employment of graduates in region; size of firm; job position, for example)	46.9%	15
University investments in technology transfer/commercialization operations	37.5%	12
Impacts on industry of university research, technical or technological assistance	37.5%	12
Industry support for post-doc/graduate/undergraduate research (e.g., university-based research; industry-based paid and unpaid research opportunities)	25.0%	8
Faculty/staff participation in state/local/regional economic planning initiatives (compensated and uncompensated)	21.9%	7
Access by companies to university research facilities and equipment	21.9%	7
Industry investment in joint venture activities	21.9%	7
Credit or non-credit courses and training programs offered to employees of particular companies	18.8%	6
University funding for "proof of concept" research	18.8%	6
University contributions to start-up companies	18.8%	6

External funding for "proof of concept" research (federal/state/industry/nor-for-profit)	18.8%	6
Industry support for contract research	18.8%	6
Training programs to improve faculty/staff/student entrepreneurship skills	15.6%	5
Research-related expenditures with local/regional vendors (within "x" miles of campus)	12.5%	4
"Normalizing" data to account for differences between and among institutions	12.5%	4
Full-time employment statistics for post docs/students with prior research relationship with the company	9.4%	3
External stakeholder service on research/technology transfer-related university advisory boards	6.3%	2
Training programs to improve post-doc/ students' research skills	0.0%	0

Additional Indicators

Student internships/volunteer service

Open-source software, innovations, and other creative activities developed by university personnel

Relatively easy: Secondary economic impacts of licensing, including product sales, induced investment, taxes paid (see work done by Lori Pressman and others at AUTM in the late 90's) - does not only have to be economic impacts of startups as listed above.

Not so easy but really important: tracking new product introductions based on other knowledge transfer channels (collaborative research, joint advising, etc. - see Agrwal and Henderson paper in 2002)

Develop metrics that track alumni and faculty participation in early stage companies

products and services such as open source software where the university receives no revenue or maintains no IP but which still have a significant economic and/or social impact

ASSOCIATION OF PUBLIC AND LAND-GRANT UNIVERSITIES

ATTACHMENT B

Commission on Innovation, Competitiveness and Economic Prosperity (CICEP)

2010 Executive Committee

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University of Massachusetts, Chairman

Michael M. Crow, President,
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Greg Schuckman, Assistant Vice President for University Relations,
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Elizabeth Unger, Academic Fellow,
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Rich Dunfee, Director, Grant Resource Center,
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Executive Assistant to the President
University of Memphis

Kevin Cullen
Director of Research & Enterprise
University of Glasgow

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President
Council on Governmental Relations

Mardy T. Eimers
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Office of Technology Transfer
National Institutes of Health

Karin Fischer
Senior Reporter
The Chronicle of Higher Education

Mary Frase
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Science Resources Statistics Division
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Chief Investment Officer
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Gregory A. Harris
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Institutional Research Group
Office of the Provost
Massachusetts Institute of Technology

Dennis Hoffman
Director
Arizona State University
Seidman Research Institute
W.P. Carey School of Business

Elizabeth Hoffman
Executive Vice President and Provost
Iowa State University

Krisztina Holly
Vice Provost
University of Southern California

John Jankowski
Program Director, Science Resource
Statistics
National Science Foundation

Christine Keller
Director of Research Policy & Analysis, and
Executive Director, Voluntary System of
Accountability
A·P·L·U

Patrick Maloney
Program Director
The Lemelson Foundation

Michael Mandel
President
South Mountain Economics

Brian McGowan
Deputy Assistant Secretary
U.S. Department of Commerce

Stephen Merrill
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Science, Technology & Economic Policy
National Academy of Sciences

Jeffrey Mervis
Deputy News Editor
Science Magazine

Ed Paisley
Vice President for Editorial
Center for American Progress

Marvin G. Parnes
Associate Vice President, Research
University of Michigan

Erik Pages
President
EntreWorks Consulting

Luis Proenza
President
University of Akron

Carol Robbins
Industry Accounts
U.S. Department of Commerce
Bureau of Economic Analysis

Mark L. Rohrbaugh, Ph.D., J.D
Director
Office of Technology Transfer
National Institutes of Health

Robert Samors
Associate Vice President for Research
A·P·L·U

Arjun S. Sanga
Associate Vice Chancellor
Office of Research and Technology Transfer
The University of Texas System

Susan G. Shows
Senior Vice President
Georgia Research Alliance

Mark Skinner
Vice President
State Science and Technology Institute

Timothy F. Slaper
Director of Economic Analysis
Indiana Business Research Center
Kelley School of Business
Indiana University

Tobin L. Smith
Vice President for Research Policy
Association of American Universities

Jim Turner
Senior Counsel & Director of Energy
Programs
A·P·L·U

Mary Jo Waits
Director, Social, Economic and Workforce
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National Governors Association

Mary L. Walshok
Associate Vice Chancellor, Public Programs
University of California, San Diego

Phil Weilerstein
Executive Director
National Collegiate Inventors and
Innovators Alliance

Jesse L. White, Jr.
Director
Office of Economic and Business
Development

Jack Wilson
President
University of Massachusetts

ATTACHMENT D

From Outputs to Outcomes: A National Workshop to Identify Additional Measures of University Contributions to Regional Economic Growth and Innovation

A White Paper

Funding Provided by the National Science Foundation

February 2010

ASSOCIATION OF PUBLIC AND LAND-GRANT UNIVERSITIES

1307 New York Avenue, NW
Suite 400
Washington, DC 20005

Workshop Summary

The purpose of this workshop is to advance the identification of measures that more completely capture the multiple contributions of universities to their regions: moving beyond traditional economic impact metrics and towards new measures and indicators that better capture the full range of university work which connects with community needs. Bringing together the expertise of the communities that are responsible for creating and using these data, the goals of the workshop are:

1) to provide recommendations to the National Science Foundation (NSF) and other constituents on measures and indicators of university work – research, teaching and engagement – which contribute to innovation and regional economic development, as well as address broader community needs;
2) to gain a better understanding of the appropriateness and suitability of different metrics; and
3) to determine whether it is feasible to systematically implement a more inclusive set of metrics on a national level.

The workshop is designed to move the national discussion beyond traditional, *output-based* measures of university contributions to economic development (e.g., patents, licenses, royalties, start-ups) and focus on identifying a subset of additional, *outcomes* measures of university contributions that deserve further testing and validation for accuracy and usefulness at the national level.

Project Background

Current measures of university contributions to regional growth and innovation are incomplete. Whether it is the substantial contributions claimed by some universities or the under-achievement of universities as is maintained by some economists and regional economic development officials, the extent and nature of universities as economic actors has been the subject of increasing scrutiny during the past few years. Questions have been raised concerning the validity of "return on investment" claims by institutions of higher education,[2] [3] especially when the resulting economic activity multipliers exceed those of common models. In addition, traditional *output* indicators used by economists and others to gauge university economic engagement, such as patent activity and licensing revenue, are often criticized as presenting an incomplete picture of the breadth and depth of university contributions to the overall prosperity and health of their local communities and regions.

Despite concern about the efficacy of various models, the use of the data itself by policy makers and others as benchmarks for 'successful' performance, either in year-to-year comparisons or comparisons among institutions, sets up a need to define a more multi-dimensional approach to the complex task of assessing the contribution of universities. Without resolution, the incentive is for universities to focus on behavior that may detract from their core missions of research and education.

The demands by local, regional and national government officials, community, industry and political leaders that higher education institutions contribute to regional and national economic development and

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[2] Siegfried, John J., Sanderson and McHenry, "The Economic Impact of Colleges and Universities" , Change, March/April 2008; abridged and modified version of article published in Economics of Education Review, October 2007.

[3] In an informal review of "economic impact statements" prepared by a sub-set of A·P·L·U institutions, David Shulenburger, Vice President for Academic Affairs at A·P·L·U , found that the "return on investment" varied from $2-$19. Shulenburger presented his analysis at the inaugural meeting of the A·P·L·U Commission on Innovation, Competitiveness and Economic Prosperity, in June 2007 in Kansas City, Mo.

innovation has been escalating.[4] These expectations have only been exacerbated in the current economic downturn.   To respond to these increasing demands and to help set realistic expectations of universities, it is imperative that institutions better articulate and demonstrate the broad impact and results of investments in — and contributions of — university research, education and engagement activities on local, regional and national economic growth and innovation.

In addition, increased competition for public funding requires appropriate and sound measures to better inform state and federal policy makers as they assess and develop funding priorities. An agreed upon set of measures would provide all parties involved in or affected by these issues with a consistent language by which to gauge the efficacy of university contributions to society.

The challenge, however, is to develop a consensus around those additional metrics that accurately reflect the university's role in the regional economy. Currently, a number of governmental and non-profit organizations are examining these issues independently, albeit with some level of information sharing.[5] The missing element has been developing specific, additional measures of university contributions to regional economic growth and development.

For example, the federal government is currently engaged in — or has recently concluded — a number of efforts to better measure innovation[6]. While these initiatives will make significant contributions to the overall effort to better measure and describe the impact of various resource and policy inputs on local, regional and national communities, no attention is devoted to the role of universities.

While many studies focus on economic development, few capture the contributions of universities either directly (e.g. as employers) or indirectly by providing intermediate outputs essential to the overall working of the economy (e.g. a well-educated workforce). A recent report issued by the Information Technology and Innovation Foundation, *The 2008 State of the New Economy Index: Benchmarking Economic Transformation in the States,* "uses twenty-nine indicators to assess that capacity and, in particular, to measure the differences in the extent to which state economies are structured and operate according to the tenets of the New Economy." Yet surprisingly, university contributions to the new economy are not measured, except for a brief reference to the numbers of patents and start-ups that emanate from university research.[7] The report goes on to call for the development of "performance-based" measures of university contributions to economic development, some of which could be considered as part of this workshop.

In some instances, other measures are being developed and deployed. The University Companies Association (UNICO (UK)) issued a report in late 2008 which identifies "a new set of robust metrics for the evaluation of knowledge transfer activities" at UK universities. These metrics are targeted specifically at university contributions and are a step forward in moving toward a common solution to this

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[4] Feller, Irwin "Virtuous and Vicious Cycles in the Contributions of Public Research Universities to State Economic Development Objectives", Economic Development Quarterly, Vol. 18, No. 2, 138-150 (2004)

[5] Organizations examining this issue include, but are not limited to, the Association of Public and Land-grant Universities (A·P·L·U), Arizona State University, Association of University Technology Managers (AUTM), Association of American Universities (AAU), U.S. Department of Commerce, U.S. Office of Science and Technology Policy, National Academies of Science, National Science Foundation, Ewing Marion Kauffman Foundation, Information Technology and Innovation Foundation (ITIF), University Companies Association UNICO, UK)).

[6] See "A Summary of Selected Government Initiatives to Measure Innovation" in "Toward Better Measurement of Innovation and Intangibles," Survey of Current Business (Bureau of Economic Analysis, January 2009) p. 20 http://www.bea.gov/scb/pdf/2009/01%20January/0109_innovation.pdf

[7] The 2008 State New Economy Index, Information Technology and Innovation Foundation, (2008), p. 64. http://www.itif.org/files/2008_State_New_Economy_Index.pdf

problem.[8]   Similarly, the Association of University Technology Managers (AUTM) has recently circulated a draft Institutional Economic Engagement (IEE) Index[9] which is designed to provide greater context and more measures of a research institution's contributions to its region by compiling information about the institution's policies and physical environment and recognizing the broad range of actors engaged in a regional innovation ecosystem.

Drawing from the broader field of university engagement, the Carnegie Foundation for the Advancement of Teaching has created a set of criteria for colleges and universities that wish to be designated as *Engaged* institutions. There may be elements of these criteria that could be refined and adjusted to capture economic development-related aspects of university contributions to their communities.[10]   Other organizations have also developed criteria, guidelines, and survey questions related to university engagement that may have some applicability to institutional economic and innovation contributions, including A‧P‧L‧U, the American Association of State Colleges and Universities (AASCU), and the Urban Serving Universities (USU) coalition.

Finally, the Science Resources Statistics Division of NSF convened an Expert Panel in 2007-08 on the Redesign of the Survey of Research and Development Expenditures at Universities and Colleges. Over two separate sessions, the panel engaged in a robust discussion about the inclusion of survey questions on university technology transfer activities. Ultimately, SRS decided to proceed with a set of pilot questions that seek information in several traditional, *output-based* areas of measurement (technology transfer transactions, start-ups, license revenue and patents). However, pilot tests of these metrics strongly indicated the need for new and more robust measures. As part of the effort to develop these new metrics, SRS is funding the A‧P‧L‧U metrics workshop on February 25, 2010 in Washington, D.C.

<p style="text-align:center">Focus & Goals of the February workshop</p>

The participants in this workshop will focus on a set of questions that aim to develop consensus on:

- whether specific proposed metrics would be useful
- if the necessary data be collected economically and efficiently
- the next steps required for the parties to validate the measures at the national level.

The workshop will be conducted using three concurrent discussion groups that will be moderated by senior university officials:

- Jack Wilson, President, University of Massachusetts
- Luis Proenza, President, University of Akron
- Elizabeth Hoffman, Executive Vice President and Provost, Iowa State University

Each discussion group will focus on a broad category of potential metrics with the goal of reaching consensus on two to four specific, possible new measures to be recommended to NSF for further testing and validation. These new measures could ultimately be included in the Foundation's annual Higher Education Research and Development (HERD) Survey and/or used by other interested governmental and non-governmental entities.

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[8] Metrics for the Evaluation of Knowledge Transfer Activities at Universities (Library House 2008), http://ec.europa.eu/invest-in-research/pdf/download_en/library_house_2008_unico.pdf
[9] AUTM Institutional Economic Engagement Index (IEE) is available at www.autm.net
[10] Carnegie Foundation for the Advancement of Teaching, Community Engagement Elective Classification http://www.carnegiefoundation.org/classifications/index.asp?key=1213

Workshop participants are being asked to review and comment on the following categories of potential measures to assist A‧P‧L‧U in identifying the three categories that hold the most promise for generating new, useful metrics that satisfy the following criteria:

- Contribute to our understanding of the role of universities in their regions, through such activities as the transfer of human capital between universities, industry, and other regional employers; technology licensing and patenting; contributions to creating and sustaining new and existing businesses, as well as activities which yield documentable contributions and solutions for communities,
- lend themselves to statistically meaningful <u>national</u> characterizations (i.e., are not anecdotal or institution/region specific), and
- can be collected from academic institutions (and do not, for example, depend on data collections from local businesses).

Please review the proposed categories listed below and indicate the top two and/or suggest additional categories for consideration by the workshop participants. Please **respond to Bob Samors (rsamors@aplu.org) by COB Friday, February 12, 2010 with your comments.**

Proposed Categories for Discussion (please indicate top two and/or propose additional categories and/or variables for consideration)

Linkages & Partnerships. *Measures of university engagement in the community that contributes to economic growth/innovation.* Data is available from universities which have voluntarily participated in engagement assessments to date. Some institutions also compile data on various types of partnerships and linkages with external constituencies, including government and industry. Few national comparisons or national reports have been completed.
- **Question 1: What questions would the data inform?**
- **Question 2: What kind of data would be useful to answer those questions**?
- Possible Examples:
  - Research agreements with "regional" organizations
  - Equipment use by "regional" organizations
  - University used as "convener" around issues and problems in their respective communities
  - Organization engagements with the university, categorized both by types of interactions (e.g., internships, fellowships, consultancies), and types of organizations (e.g. SMEs or large entities)
  - Interaction (and types) with the creative class
  - Equipment use by non-university entities
  - Numbers of students served (e.g., non-traditional, online, continuing education, corporate training)
  - Numbers of businesses represented at university-sponsored activities
  - Partnerships categorized by various funding mechanisms
- **End of Morning Session: Identify priority variables in this category**
- **Question 3: Who should collect the data and report it?**
- **Question 4: How would we operationalize these variables?**
- **Question 5: Do the suggested variables appear to achieve their purpose? Are they feasible to collect? What groups should be involved in collecting? How important are they to collect?**

Entrepreneurial Activity. *Activity which organizes and/or embraces risk at the student, faculty and institutional level, and assists business ventures in handling the same.* Some data are available in the variables identified below; others have no national data set.

- **Question 1: What questions would the data inform?**
- **Question 2: What kind of data would be useful to answer those questions**? Possible Examples:
    - Start-ups/new business formation: measures of university contributions in the creation, sustainability and growth of new businesses. Data points could include: numbers of companies and location; funding acquired by the company (including federal grants received); number of employees; life of company.
    - Sources of start-up data from within universities; from traditional licensing, entrepreneurship programs or other activities.
    - Technologies (and their potential fields) likely to serve as a basis for start-ups and their relative dates of use versus non-start up technologies
    - University role in start-up creation, sustainability and/or growth assistance in securing capital; institutional investments in company; licensing technology; student founders; etc)
    - Relative income received from start-up companies versus non-start up companies by universities (in a variety of categories)
    - Faculty service and consulting: measures of faculty involvement in service to the region and consulting related to economic growth and innovation. (In the U.S., no know national data source. Data is held at universities, perhaps not systematically, as part of conflict of interest processes.) Possible data points:
        - Range of service activities
        - Number of individuals who provide service (such as to local government and/or non-profits)
        - Number of individuals who consult
        - Departments and companies involved in consulting
        - Involvement of other personnel in consulting engagements
        - Number of hours involved in consulting
- **End of Morning Session: Identify priority variables in this category**
- **Question 3: Who should collect the data and report it?**
- **Question 4: How would we operationalize these variables?**
- **Question 5: Do the suggested variables appear to achieve their purpose? Are they feasible to collect? What groups should be involved in collecting? How important are they to collect?**

- Human Capital transfer: *measures of the movement of individuals and knowledge from universities into the community*. Many data sets are available, although perhaps not for some of the variables listed below.
    - **Question 1: What questions would the data inform?**
    - **Question 2: What kind of data would be useful to answer those questions**? Possibilities:
        - Co-operative education opportunities provided through internships, experiential learning projects, capstone courses
        - Exit survey of all graduating students (undergraduate and graduates) for employment, location and/or plans
        - Follow up survey at five and ten years for employment, location and/or plans
        - Measures of faculty movement into/out of universities

- ▪ Research with external organizations, measured by number of agreements, number of unique research partners, and number of students participating in the research
- **End of Morning Session: Identify priority variables in this category**
- **Question 3: Who should collect the data and report it?**
- **Question 4: How would we operationalize these variables?**
- **Question 5: Do the suggested variables appear to achieve their purpose? Are they feasible to collect? What groups should be involved in collecting? How important are they to collect?**

ATTACHMENT E

ASSOCIATION OF
PUBLIC AND
LAND-GRANT
UNIVERSITIES

Identifying New Performance Metrics of University Contributions to Regional Innovation and Economic Growth

Hosted by
Association of Public and Land-grant Universities (A · P · L · U)
with generous support from
National Science Foundation

Washington, DC
February 25, 2010

PARTICIPANT GUIDE

Thank you again for participating in this workshop to identify new measures of university contributions to regional innovation and economic growth. This event holds great potential to help the data generator and data user communities move forward toward a set of metrics that capture the broad spectrum of university contributions to their regional economies.

To make this effort most productive, you have been assigned to a specific discussion group that will meet for two hours in the morning and then re-convene after lunch for an additional two hours. Please stay in the group to which you are assigned. We have made a considerable effort to ensure that each topic will benefit from a wide range of perspectives. You will have an opportunity to comment on the findings and recommendations of the other discussion groups at the end of the day.

The emphasis in each group will be on free and open discussion with a minimum of interference from the facilitator, whose primary task will be to keep the conversation focused on the broad goals of the workshop. We recognize that there are numerous challenges in defining suitable metrics in this area. This is a discussion that has gone on for at least 30 years. However, the workshop is not designed to examine the "problems" as much as it is geared toward identifying potential new solutions.

Ultimately, we hope to recommend to the National Science Foundation and other organizations 4-8 metrics which we collectively think would move understanding in this area forward.

We recognize that university contributions to the economy often extend beyond local or even regional boundaries. However, for the purposes of this workshop we are focusing on the regional aspects of university contributions, as a starting point. In addition, a number of participants have noted the importance of "context setting" when examining or evaluating specific metrics. While that is an important issue, we feel it is best left to individual universities to set the context of specific measures for their particular institution. We welcome specific suggestions on the elements that should be included in setting the context which can be sent to Bob Samors at rsamors@aplu.org.

Metrics Workshop Discussion Guide

Workshop participants will be assigned to one of three discussion groups:

Linkages and Partnerships   (Facilitator: Elizabeth Hoffman, Iowa State University)
Entrepreneurial Activity   (Facilitator: Jack Wilson, University of Massachusetts)
Human Capital Transfer   (Facilitator: Luis Proenza, University of Akron)

Each discussion group will answer the following questions:

<u>Morning Session</u>

Question 1:   What questions would the data inform?

Question 2:   What kind of data would be useful to answer those questions?

End of Morning
Session: Identify 3 – 6 priority variables in each category for in-depth analysis during
                Afternoon Session

<u>Afternoon Session</u>

Questions for each variable identified at the conclusion of the Morning Session

Question 3   How would we define specific variables? For example, equipment use by
               regional organizations could mean: 1) number of companies that lease or rent time
               on equipment at an institution; and/or 2) amount of time equipment is used by
               non-university users.

Question 4   Who should collect the data and report it? How often should the data be
               collected?

Question 5:   Do the suggested variables appear to achieve their purpose? Are they feasible to
               collect? How important are they to collect?

Linkages & Partnerships

Question 2:   Potential New Metrics

o   These options may suggest discussion points for Question 2: What Kind of Data Would be Useful to Answer (Those) Questions? Participants should not feel constrained by these suggestions – the list of potential metrics can be added to, subtracted from or ignored completely. The list is designed to serve as a starting point for discussion.

Linkages & Partnerships: *Measures of university engagement in the community that contributes to economic growth/innovation.* Data is available from universities which have voluntarily participated in engagement assessments to date. Some institutions also compile data on various types of partnerships and linkages with external constituencies, including government and industry.   Few national comparisons or national reports have been completed.

Possible Metrics for discussion under Linkages & Partnerships between universities and their external constituencies and stakeholders; consideration should include the role of the university as a convener and/or anchor in the region:

- Research agreements with "regional" organizations
- Equipment use by "regional" organizations
- University used as "convener" around issues and problems in their respective communities
- Organization engagements with the university, categorized both by types of interactions (e.g., internships, fellowships, consultancies), and types of organizations (e.g. SMEs or large entities)
- Interaction (and types) with the creative class
- Equipment use by non-university entities
- Numbers of students served (e.g., non-traditional, online, continuing education, corporate training)
- Revenue received from all kinds of partnerships (local vs. national vs. international sources)
- Numbers of businesses represented at university-sponsored activities
- Partnerships categorized by various funding mechanisms
- Materials made available for broad public use by institution

Entrepreneurial Activity

Question 2:   Potential New Metrics

o   These options may suggest discussion points for Question 2: What Kind of Data Would be Useful to Answer (Those) Questions? Participants should not feel constrained by these suggestions – the list of potential metrics can be added to, subtracted from or ignored completely. The list is designed to serve as a starting point for discussion.

Entrepreneurial Activity: *Activity which organizes and/or embraces risk at the student, faculty and institutional level, and assists business ventures in handling the same.* Some data are available; others have no national data set. Possible examples of Entrepreneurial Activity:

- Start-ups/new business formation: measures of university contributions in the creation, sustainability and growth of new businesses. Data points could include: numbers of companies and location; funding acquired by the company (including federal grants received); number of employees; life of company.
- Sources of start-up data from within universities; from traditional licensing, entrepreneurship programs or other activities.
- Technologies (and their potential fields) likely to serve as a basis for start-ups and their relative dates of use versus non-start up technologies
- University role in start-up creation, sustainability and/or growth assistance in securing capital; institutional investments in company; licensing technology; student founders; etc)
- Relative income received from start-up companies versus non-start up companies by universities (in a variety of categories)
- Faculty service and consulting: measures of faculty involvement in service to the region and consulting related to economic growth and innovation. (In the U.S., no known national data source. Data is held at universities, perhaps not systematically, as part of conflict of interest processes.) Possible data points:
  - Range of service activities
  - Number of individuals who provide service (such as to local government and/or non-profits)
  - Number of individuals who consult
  - Departments and companies involved in consulting
  - Involvement of other personnel in consulting engagements
  - Number of hours involved in consulting

Human Capital Transfer

Question 2:   Potential New Metrics

o   These options may suggest discussion points for Question 2: What Kind of Data Would be Useful to Answer (Those) Questions? Participants should not feel constrained by these suggestions – the list of potential metrics can be added to, subtracted from or ignored completely. The list is designed to serve as a starting point for discussion.

Human Capital Transfer: *Measures of the movement of individuals and knowledge from universities into the community*. Many data sets are available, although perhaps not for all variables of interest. Possible examples in Human Capital Transfer:

- Co-operative education opportunities provided through internships, experiential learning projects, capstone courses
- Exit survey of all graduating students (undergraduate and graduates) for employment, location and/or plans (local vs. national vs. international), tracking school/college and academic department
- Follow up survey at 5 and 10 years for employment, location and/or plans
- Measures of faculty movement into/out of universities
- Research with external organizations, measured by number of agreements, number of unique research partners, and number of students participating in the research
- Jobs inside the institution (direct and indirect)

ATTACHMENT F

WORKSHOP TO IDENTIFY
NEW MEASURES OF UNIVERSITY CONTRIBUTIONS TO
REGIONAL ECONOMIES

Breakout 1 – Linkages and Partnerships – Room 231

Elizabeth Hoffman, Iowa State University, *Facilitator*
Dorothy Air, University of Cincinnati
Joe Allen, Allen and Associates
Dana Bostrom, Portland State University
Ronda Britt, National Science Foundation
David Cox, University of Memphis
Jennifer Danek, Implementation Strategies
Tony DeCrappeo, Council on Governmental Relations
Mardy Eimers, University of Missouri

Maryann Feldman, University of North Carolina at Chapel Hill
Christina Gabriel, Heinz Endowments
John Jankowski, National Science Foundation
Mike Mandel, South Mountain Economics
Carol Robbins, Bureau of Economic Analysis
Mark Skinner, State Science and Technology Institute
Jim Turner, A·P·L·U
Linda Kay Benning, A·P·L·U, *Rapporteur*

Breakout 2 – Entrepreneurial Activity – Room 233

Jack Wilson, University of Massachusetts, *Facilitator*
Arjun Sanga, University of Texas System, *Facilitator*
Zoe Ambargis, Bureau of Economic Analysis
Mark Boroush, National Science Foundation
Kevin Cullen, University of Glasgow
Steve Ferguson, National Institutes of Health
Matt Harbaugh, Innovation Works
Dennis Hoffman, Arizona State University
Krisztina Holly, University of Southern California
Stephen Merrill, National Academy of Sciences

Jeff Mervis, *Science*
Erik Pages, EntreWorks Consulting
Ed Paisley, Center for American Progress
Mark Rorhbaugh, National Institutes of Health
Susan Shows, Georgia Research Alliance
Tim Slaper, Indiana University
Toby Smith, Association of American Universities
Jesse White, University of North Carolina at Chapel Hill
Jeff Brancato, University of Massachusetts, *Rapporteur*

Breakout 3 – Human Capital Transfer – Room 383

Luis Proenza, University of Akron, *Facilitator*
Jeff Alexander, SRI International
Philip Auerswald, George Mason University
Mary Frase, National Science Foundation
Karin Fischer, *The Chronicle of Higher Education*
Greg Harris, Massachusetts Institute of Technology
Patrick Maloney, Lemelson Foundation

Marvin Parnes, University of Michigan
Mary Jo Waits, National Governors Association
Mary Walshok, University of California, San Diego
Phil Weilerstein, National Collegiate Inventors and Innovators Alliance
Christine Keller, A·P·L·U, *Rapporteur*
Bob Samors, A·P·L·U, *Rapporteur*

ATTACHMENT G

A·P·L·U METRICS WORKSHOP
FACILITATOR GUIDE

1. Name cards for each participant are on the table in each breakout room. Observers will not have name cards. It is your choice whether they sit at the table or along the outside wall.

2. Remind participants that the purpose of the workshop is to identify potential metrics that are data-supported. We are not looking for "best practices" or other anecdotal assessments of performance/outcomes of university engagement in regional economies.

Morning Session (2 hours)

3. The first 30-45 minutes of the morning session should focus on "*What are the questions universities and external constituents/stakeholders want answered* regarding university contributions to regional economies? Encourage creative and free thinking. We want to surface as many questions as possible without much – if any - discussion of the merits of a specific question. The rapporteurs should record the questions on the easel pads (recommended: two per page).

4. The next 45 minutes or so should focus on the possible data-based metrics that might be useful in answering each of the identified questions. Do not discourage overlap or repetition of data points across multiple questions. It is not necessary to define in detail what the "data points" really mean ("use of university facilities" is sufficient – the definition of "use of" will occur in the afternoon).

5. The final 15 minutes should focus on identifying 4-6 data points for in-depth discussion in the afternoon.

Afternoon Session (2 hours)

6. For each of the 4-6 metrics, first define what they mean (e.g., use of facilities could include the number of companies that lease or rent time on university equipment/facilities and/or the amount of time university equipment is used by non-university entities.)

7. Once a metric has been defined, identify who should collect the data; and who should report the data and how it should be reported.

8. Finally, review the metric variable(s) with a focus on: 1) whether the metric ultimately helps to answer the questions identified in the morning session; 2) whether the data is feasible to collect (mechanically, financially, politically); and 3) how important it is to collect the data.

ATTACHMENT H

A·P·L·U Metrics Workshop Breakout Session Guides
February 25, 2010

HUMAN CAPITAL TRANSFER BREAKOUT
Luis Proenza, University of Akron, *Facilitator*

PRELIMINARY RECOMMENDED MEASURES:
Growing the workforce for the global knowledge economy

- Activities:
  - Student engagement – coops, internships, mentorships, work study, international experiences, service learning
  - Faculty/staff engagement – industry partnerships (including SBIR/STTR etc.), consultancies and board membership (industry and community)
  - Industry engagement in campus activities – visiting committees, advisory committees, mentoring, lectures, courses (adjuncts)
  - Entrepreneurial activities – courses, centers, competitions, sharing experiences (lectures, clubs)

- Participants:
  - Students – traditional/non-traditional
  - Faculty
  - Staff
  - Alumni
  - Industry professionals – by sector/type of interaction (adjunct, mentors)

- Outcomes (normed/ratios where appropriate):
  - Jobs created
  - Companies created
  - Investments, grants and other funding secured for university enabled companies
  - Jobs filled
  - Faculty hires by industry
  - Student job placements/grad school enrollments (location/in-state-out-state/zip code)
  - Net migration – where students come from; where they end up 1-5-10 years post-graduation (new data needs to be collected; web-based? National in scope with university-specific information accessible); where faculty come from – where they go

ENTREPRENEURIAL ACTIVITY BREAKOUT
Jack Wilson, University of Massachusetts, *Facilitator*
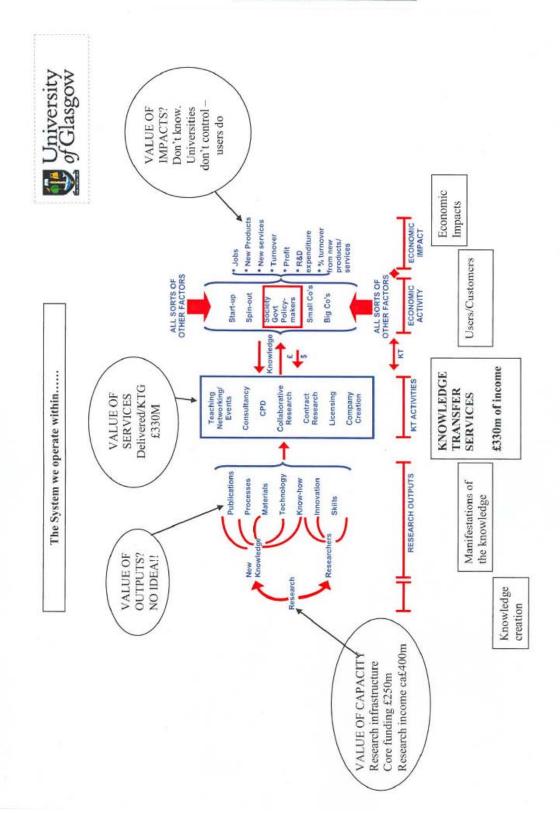
PRELIMINARY RECOMMENDED MEASURES:

- Faculty consulting relationships with industry
- Consumer satisfaction surveys of industry partners
- Student –related impacts
  - Participation in entrepreneurship-focused academic programs
  - Participation in other entrepreneurship activities
  - Internships in start-up and spin-off companies
  - Mentoring programs
  - Student prize and competitions (Business Plan; Innovations)
  - Student Venture funds

- Direct university involvement in financing technologies and companies
  - Seed funds
  - Proof of concept funds
  - Other internal investments

LINKAGES AND PARTNERSHIPS BREAKOUT
Elizabeth Hoffman, Iowa State University, *Facilitator*

PRELIMINARY RECOMMENDED MEASURES:

- Faculty/staff/students giving expertise to the community; some for pay (consulting); serving on economic boards, internships, service learning; and unpaid ways that interact with community, business and industry; could be one way or two way. Could be local community or globally

- Investments in university by external entities like sponsored research but doesn't capture foundation or philanthropic or start-up. Where you have investments by business and industry, that isn't currently captured. But under Federal conflict of interest rules, you have to collect consulting data by faculty.

- Start-ups and nexus of activity related to them; the public good aspect is important like open source technology or code that comes from the university that has economic value that isn't captured by AUTM data. Some is not yet collected.

- Joint ventures – a lot of major civic projects that involve many entities like papers, including American universities and foreign universities

- Huge new set of data is coming available that universities may not be thinking about to inform our understanding of the interplay of the university and the rest of the world.

ATTACHMENT I

University of Glasgow

Kevin Cullen Feb 2010

The System we operate within……

VALUE OF IMPACTS? Don't know. Universities don't control – users do

VALUE OF SERVICES Delivered/KTG £330M

VALUE OF OUTPUTS? NO IDEA!!

VALUE OF CAPACITY Research infrastructure Core funding £250m Research income ca£400m

ALL SORTS OF OTHER FACTORS

Jobs • New Products • New services • Turnover • Profit • R&D expenditure • % turnover from new products/ services

Start-up Spin-out Society Govt Policy-makers Small Co's Big Co's

ALL SORTS OF OTHER FACTORS

Knowledge £ $ KT

Teaching Networking/ Events Consultancy CPD Collaborative Research Contract Research Licensing Company Creation

Publications Processes Materials Technology Know-how Innovation Skills

New Knowledge Research Researchers

ECONOMIC IMPACT

ECONOMIC ACTIVITY

KT ACTIVITIES

RESEARCH OUTPUTS

Economic Impacts

Users/Customers

KNOWLEDGE TRANSFER SERVICES £330m of income

Manifestations of the knowledge

Knowledge creation

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ATTACHMENT H

Commission on Innovation, Competitiveness and Economic Prosperity

Institutional Assessment Tool to Enhance Regional Innovation and Prosperity©

Many characteristics of a university making an impact on regional economic development are listed below. Taken together, these characteristics can serve as a self-assessment tool that an institution could use to evaluate its particular engagement in regional economic development. Several listed traits relate to cultural aspects of public colleges and universities. Other characteristics are focused on structural elements (e.g., existence of specific positions, programs or offices to facilitate increased partnerships with the external community). Yet other aspects relate to the interface between the university and the community and require an understanding of the important synergistic relationship between the local university and regional economic development. These latter aspects are premised on the existence of a reciprocal relationship with the external community, recognizing its contributions and respecting its knowledge and perspective.

An institution may be economically engaged without demonstrating all of the characteristics listed in this document. This tool does not pretend to capture every possible issue or topic related to an institution's role in regional economic development. Innovation to enhance and create economic prosperity depends on regional factors and the culture of the educational institution. Therefore, institutions are encouraged to use this document as a checklist or guide to stimulate conversations on campus and result in appropriate strategies and actions. These efforts will enhance the institution's economic role and impact on its local, regional, and/or state-wide community while providing benefits to faculty and students and advancing the institution's research, instruction, and broader social objectives**.**

A university conducts its economic development work in a geographic footprint. Sometimes we refer to this geographic footprint as community or region, or we modify it with words like local, state, national, or international to help clarify the geographic area being served. This document will use the word 'community' to define the geographic area being served, recognizing that the service area specified for or assumed by the institution (i.e., the city, county, region, state(s), nation, or world) varies by institution and by the specific program or economic development activity. Similarly, the term "economic engagement" has various interpretations across the higher education community. Its use in this tool is meant to help guide campus conversations, not prescribe a particular view of how an institution defines its contributions to its community.

Characteristics to help universities become the best possible partner in regional economic growth & development

Which <u>best</u> describes the role/perspective from which you are completing this survey?

___ Technology Transfer	___ Financial Administration
___ Economic Development/ Outreach	___ Investigator/Researcher
___ Academic Administration	___ Inventor
___ Government Relations	___ Faculty
___ Research Administration	___ Other (Please specify) _____

What organizational level best describes your position within the institution:
___ Senior Administrator (President or Chancellor; Member of Cabinet)
___ Director of Division/Office/Center
___ Tenured Faculty
___ Non-Tenured Faculty
___ Staff (Non-faculty)

Rating Chart – Part I
How do you assess the institution's current performance?

Scale: 1 = Poor   2= Fair   3= Good   4= Superior   N = No Opinion

How do you assess the institution's current performance?

A. Engage and Assert Institutional Leadership

1. Articulate mission expectations that encourage and promote engagement, scholarship and innovation by faculty, staff and students and that contribute to economic growth in the community. · 1   2   3   4   N

2. Work closely with governments and businesses to understand regional economic development priorities. · 1   2   3   4   N

3. Identify key research strengths of the university and, where appropriate, align them with the strengths and innovation needs of regional industry, expectations of government leaders and the economic development priorities of the community. · 1   2   3   4   N

4. Cultivate an active focus on the training and education of incumbent and future workers to create the skills necessary for competitiveness in the 21st century. · 1   2   3   4   N

5. Actively engage senior campus leaders in regional economic development dialogue and initiatives. · 1   2   3   4   N

B. Create a Supportive Culture

1. Develop institutional faculty reward systems that recognize faculty involvement in economic development (e.g., technology transfer, creation of intellectual property, award of patents and licenses, and establishment of start-up companies) and community partnerships as another form of disseminating scholarship.

    1 2 3 4 N

2. Recognize and promulgate policies and processes that facilitate effective university-community interactions.

    1 2 3 4 N

3. Support and strengthen university-community partnerships, including those involving applied research and the use of academic facilities by industry.

    1 2 3 4 N

4. Support consulting and exchange programs for faculty, internship opportunities for students, and other programs that enhance university-community partnerships.

    1 2 3 4 N

5. Promote an understanding that community needs often require an interdisciplinary and/or inter-institutional response.

    1 2 3 4 N

6. Support alignment of curriculum to meet continuing education requirements of industry.

    1 2 3 4 N

7. Encourage the development of more efficient contracting procedures for business to access university research and instructional resources.

    1 2 3 4 N

C. Ensure that University Activities Benefit the Public

1. Leverage university assets to support and enhance regional economic activity, such as attracting and retaining companies and building industry clusters.

    1 2 3 4 N

2. Enhance the impact of student education programs (degree, certificate, continuing education) for the current and future regional workforce and post-graduation career pathways through timely programs that align with changing regional needs.

    1 2 3 4 N

3. Develop and maintain a vibrant technology transfer and commercialization capability emphasizing regional economic growth objectives.

    1 2 3 4 N

4. Link the university to the regional technology base, e.g., advisory boards of external stakeholders for technology transfer, entrepreneurship programs for faculty and students, seed funding programs for university-based startups, incubators (real or virtual) and research parks.

    1 2 3 4 N

5. Promote linkages and lower barriers between faculty and regional companies seeking access to expertise.

    1 2 3 4 N

6. Encourage business and government leaders to value and utilize the university's visual and performing arts, sports and other cultural activities that cultivate a dynamic local environment and attract a talented workforce.

    1 2 3 4 N

How do you assess the institution's current performance?

D. Develop an Innovation Economy

1. Inventory, develop, and enhance the existence of public-private partnerships and programs, including those with national laboratories and local and regional industry.

    1   2   3   4   N

2. Nurture the presence of an infrastructure that supports innovation, e.g., programs that enable proof of concept or reduction to practice R & D, pilot facilities, technical assistance, and venture capital.

    1   2   3   4   N

3. Identify, track, and inform colleagues and partners of established statutes, mandates, and governmental policies related to economic development.

    1   2   3   4   N

4. Partner with alumni and other community members to define public and private investments that catalyze economic and innovative growth.

    1   2   3   4   N

5. Analyze local and regional targeted industry studies to assist in creating new industry and training students to work in those industries.

    1   2   3   4   N

6. Develop partnerships with government at all levels to retain and expand existing businesses and create and attract new business and professional opportunities.

    1   2   3   4   N

7. Provide technical assistance and support to small businesses.

    1   2   3   4   N

8. Facilitate collaboration across boundaries to overcome regional barriers to innovation.

    1   2   3   4   N

E. Provide Relevant Educational Opportunities and Programs

1. Create a culture of entrepreneurship, including the development of cross-disciplinary, integrated curricula; student entrepreneurship minors/majors, clubs, and residence halls and inter-institutional programs.

    1   2   3   4   N

2. Create an administrative infrastructure with policies and procedures to ensure quality interactions with regional partners, including other institutions and business and industry, e.g., experiential learning centers, community college transfer offices, and curricula consortia.

    1   2   3   4   N

3. Deliver flexible curricula available at times and places that enable students and community workforce members to pursue career paths that are in demand.

    1   2   3   4   N

4. Provide formal opportunities for talent development through innovative internships and coop experiences across a wide range of academic programs.

    1   2   3   4   N

5. Ensure placement services highlight regional placement opportunities, including the use of contacts with local alumni.

    1   2   3   4   N

F. Promote Openness, Accessibility and Responsiveness

1. Develop user-friendly systems to allow access to faculty and staff expertise, advanced research and development facilities, and information technology infrastructure.

    1   2   3   4   N

How do you assess the institution's current performance?

2. Provide a designated point of contact for industry and economic development agencies.

    1   2   3   4   N

3. Develop structures and networks (e.g., advisory groups, forums) to facilitate meetings between key university faculty, staff and administrators and the region's business and government leaders.

    1   2   3   4   N

4. Facilitate civic discourse and contribute to community understanding of complex issues.

    1   2   3   4   N

G. Communicate Contributions, Successes, Achievements that Benefit Region

1. Develop communications strategies that highlight success stories across the institution and utilize all avenues of dissemination, including new media tools.

    1   2   3   4   N

2. Educate faculty regarding opportunities for and the benefits of their participation in regional economic development activities.

    1   2   3   4   N

3. Report economic development contributions to key stakeholders, including governing boards, alumni, external constituents, campus community, and the local media.

    1   2   3   4   N

Rating Chart – Part II

How important is this activity to the institution's role in regional economic development?

Scale: 1 = Not Important   2 = Moderately Important   3 = Important
4 = Very Important   N = No Opinion

How important is this activity to the institution's role in regional economic development?

A. Engage and Assert Institutional Leadership

1. Articulate mission expectations that encourage and promote engagement, scholarship and innovation by faculty, staff and students and that contribute to economic growth in the community.   1 2 3 4 N

2. Work closely with governments and businesses to understand regional economic development priorities.   1 2 3 4 N

3. Identify key research strengths of the university and, where appropriate, align them with the strengths and innovation needs of regional industry, expectations of government leaders and the economic development priorities of the community.   1 2 3 4 N

4. Cultivate an active focus on the training and education of incumbent and future workers to create the skills necessary for competitiveness in the 21st century.   1 2 3 4 N

5. Actively engage senior campus leaders in regional economic development dialogue and initiatives.   1 2 3 4 N

B. Create a Supportive Culture

1. Develop institutional faculty reward systems that recognize faculty involvement in economic development (e.g., technology transfer, creation of intellectual property, award of patents and licenses, and establishment of start-up companies) and community partnerships as another form of disseminating scholarship.   1 2 3 4 N

2. Recognize and promulgate policies and processes that facilitate effective university-community interactions.   1 2 3 4 N

3. Support and strengthen university-community partnerships, including those involving applied research and the use of academic facilities by industry.   1 2 3 4 N

4. Support consulting and exchange programs for faculty, internship opportunities for students, and other programs that enhance university-community partnerships.   1 2 3 4 N

5. Promote an understanding that community needs often require an interdisciplinary and/or inter-institutional response.   1 2 3 4 N

How important is this activity to the institution's role in regional economic development?

6. Support alignment of curriculum to meet continuing education requirements of industry.   1   2   3   4   N

7. Encourage the development of more efficient contracting procedures for business to access university research and instructional resources.   1   2   3   4   N

C. Ensure that University Activities Benefit the Public

1. Leverage university assets to support and enhance regional economic activity, such as attracting and retaining companies and building industry clusters.   1   2   3   4   N

2. Enhance the impact of student education programs (degree, certificate, continuing education) for the current and future regional workforce and post-graduation career pathways through timely programs that align with changing regional needs.   1   2   3   4   N

3. Develop and maintain a vibrant technology transfer and commercialization capability emphasizing regional economic growth objectives.   1   2   3   4   N

4. Link the university to the regional technology base, e.g., advisory boards of external stakeholders for technology transfer, entrepreneurship programs for faculty and students, seed funding programs for university-based startups, incubators (real or virtual) and research parks.   1   2   3   4   N

5. Promote linkages and lower barriers between faculty and regional companies seeking access to expertise.   1   2   3   4   N

6. Encourage business and government leaders to value and utilize the university's visual and performing arts, sports and other cultural activities that cultivate a dynamic local environment and attract a talented workforce.   1   2   3   4   N

D. Develop an Innovation Economy

1. Inventory, develop, and enhance the existence of public-private partnerships and programs, including those with national laboratories and local and regional industry.   1   2   3   4   N

2. Nurture the presence of an infrastructure that supports innovation, e.g., programs that enable proof of concept or reduction to practice R & D, pilot facilities, technical assistance, and venture capital.   1   2   3   4   N

3. Identify, track, and inform colleagues and partners of established statutes, mandates, and governmental policies related to economic development.   1   2   3   4   N

4. Partner with alumni and other community members to define public and private investments that catalyze economic and innovative growth.   1   2   3   4   N

5. Analyze local and regional targeted industry studies to assist in creating new industry and training students to work in those industries.   1   2   3   4   N

How important is this activity to the institution's role in regional economic development?

6. Develop partnerships with government at all levels to retain and expand existing businesses and create and attract new business and professional opportunities.

    1   2   3   4   N

7. Provide technical assistance and support to small businesses.

    1   2   3   4   N

8. Facilitate collaboration across boundaries to overcome regional barriers to innovation.

    1   2   3   4   N

E. Provide Relevant Educational Opportunities and Programs

1. Create a culture of entrepreneurship, including the development of cross-disciplinary, integrated curricula; student entrepreneurship minors/majors, clubs, and residence halls and inter-institutional programs.

    1   2   3   4   N

2. Create an administrative infrastructure with policies and procedures to ensure quality interactions with regional partners, including other institutions and business and industry, e.g., experiential learning centers, community college transfer offices, and curricula consortia.

    1   2   3   4   N

3. Deliver flexible curricula available at times and places that enable students and community workforce members to pursue career paths that are in demand.

    1   2   3   4   N

4. Provide formal opportunities for talent development through innovative internships and coop experiences across a wide range of academic programs.

    1   2   3   4   N

5. Ensure placement services highlight regional placement opportunities, including the use of contacts with local alumni.

    1   2   3   4   N

F. Promote Openness, Accessibility and Responsiveness

1. Develop user-friendly systems to allow access to faculty and staff expertise, advanced research and development facilities, and information technology infrastructure.

    1   2   3   4   N

2. Provide a designated point of contact for industry and economic development agencies.

    1   2   3   4   N

3. Develop structures and networks (e.g., advisory groups, forums) to facilitate meetings between key university faculty, staff and administrators and the region's business and government leaders.

    1   2   3   4   N

4. Facilitate civic discourse and contribute to community understanding of complex issues.

    1   2   3   4   N

How important is this activity to the institution's role in regional economic development?

G. Communicate Contributions, Successes, Achievements that Benefit Region

1. Develop communications strategies that highlight success stories across the institution and utilize all avenues of dissemination, including new media tools.

   1   2   3   4   N

2. Educate faculty regarding opportunities for and the benefits of their participation in regional economic development activities.

   1   2   3   4   N

3. Report economic development contributions to key stakeholders, including governing boards, alumni, external constituents, campus community, and the local media.

   1   2   3   4   N