

**DISCUSSION DRAFT OF POTENTIAL RECOMMENDATIONS**

**Prepared for the Second Meeting**

**of the**

**MEASURING INNOVATION IN THE  
21<sup>ST</sup> CENTURY ECONOMY  
ADVISORY COMMITTEE**

**Auditorium**

**U. S. Department of Commerce  
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# DRAFT OUTLINE FOR THE REPORT OF RECOMMENDATIONS

## MEASURING INNNOVATION

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***THE DISCUSSION AT THE SEPTEMBER 12 MEETING OF THE ADVISORY COMMITTEE WILL FOCUS ON THE RECOMMENDATIONS TO BE INCLUDED IN CHAPTER 4.***

***THE RECOMMENDATIONS SELECTED WILL BE DETAILED IN THIS CHAPTER OF THE REPORT OF RECOMMENDATIONS. FOR EACH RECOMMENDATION THERE WILL BE A DESCRIPTION OF THE PROPOSED ACTION, THE IMPLEMENTING DETAILS AND TIMING, AND A DISCUSSION OF THE IMPACT OF THE RECOMMENDATION ON INNOVATION MEASUREMENT.***

Chapter 7. Conclusion and Next Steps

## GUIDING PRINCIPLES

Following the inaugural meeting of the Advisory Committee in February 2007, Secretary Gutierrez provided the Committee with the following guidance:

*The purpose of the Committee is to recommend ways that we can better measure innovation and its impact on the U.S. economy, where innovation is defined as the development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm.*

*The recommendations should identify data that would provide useful estimates of the resources devoted to and value generated by innovation. The Committee's work should include building on the way firms assess the effectiveness of their innovative activities. Any new or improved metric recommended should be selected on the basis of its ability to provide appropriate signals of changes in business behavior for the purpose of informing policy debates. The recommendations should not only focus on measuring innovation activities and inputs, but should also focus on the results and output of innovation. Furthermore, the recommendations should allow for analysis at industry, sector, country, and inter-country levels.*

In the course of providing suggestions and feedback on what recommendations the Committee should include their report to the Secretary, the following additional principles or guidance were put forward:

1. A conservative approach should be taken to the initiation of any new data collection effort.
2. Any Advisory Committee recommendations or new innovation metrics will need to recognize tradeoffs between costs (including direct program costs and burden placed on potential survey respondents) and potential benefits and also consider resource and regulatory constraints.
3. The Committee needs to take into account programs currently underway in the various U.S. statistical agencies, as well as program areas that have been identified as promising for future development. Private sector and international work on innovation measurement should also be considered.
4. Because of the nature of innovation and, in particular, the collaborative nature of the innovative process, there needs to be tolerance of qualitative and even subjective measures.
5. Innovation measurement should not be static. Measurement needs to be treated less like a 'project' and more like an ongoing 'dialogue.' There is learning and improvement to be gained from measuring, especially from the dialogue that is involved in defining and relating existing and new measures.

6. When developing better ways to quantify innovation in the marketplace, consideration should be given to measuring the impact that regulatory policies (e.g., tax, education, immigration and accounting policies) have on innovation. Regulatory policies may explicitly support innovation (e.g., education policies focused on particular educational skills needed for innovative activities) while some non-innovation-related regulatory policies may have the unintended consequence of inhibiting innovation (e.g., immigration policy and some Sarbanes-Oxley rules).
7. The Committee recognizes that some useful recommendations may take the form of recommendations for further research or the implementation of pilot projects. To the extent possible, new innovation measures should be able to be 'back-tested'; that is, if applied to historical data, the measures should produce the expected innovation relationship.
8. Efforts should be made to ensure recommendations result in measures that are internationally compatible, either now or in the future.

## **INNOVATION DATA COLLECTION – FILLING GAPS AND REFINING DATA**

### **1. Improvements in service sector data**

#### **Description**

It is widely believed that much innovation in recent decades has taken place in the service sector, and this belief is bolstered by evidence that service sector productivity has increased after a long period of stagnation. However, collection of data on the service sector has lagged that of other sectors (in particular, manufacturing), and improved service sector data collection is a necessary step toward better measurement of innovation in the service sector. The proposal suggests improving service sector data by: (a) development of a more nuanced classification system with finer granularity of data on different types of economic activity; (b) improved survey data in tracking service sector activity, (c) improved accounting for the transfer of intangible assets and (d) development of new service price indices and more detailed input/output matrices.

The Census Bureau has begun to increase its annual survey coverage of service industries. It has long covered retail and wholesale trade. Of the rest of the service sectors, which currently account for 55 percent of GDP, the Census Bureau's annual survey covers 30 percent of GDP. It proposes to cover all remaining service sectors by FY2010 if funds are appropriated by Congress.

Since a number of service sector industries (e.g., software, consulting, and intellectual property licensing and transfers) are considered particularly innovative, better data on the service sector will improve our understanding of innovation processes. Improved services price indices will improve estimates of inflation-adjusted inputs purchased from the service sector inputs, including those purchased from highly innovative industries.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) services data be improved and survey coverage increased as quickly as possible within budget constraints; and/or (2) additional detail on service firms' innovation investments and outcomes be collected, possibly through a pilot project; and/or (3) research be undertaken to identify service sector data that would be most useful in measuring innovation in service sectors.*

#### **Discussion Questions**

- What are the most essential improvements and, given cost constraints, where should the priorities lie?
- To what extent would full coverage of the Census Bureau's annual survey to the service sector improve innovation measurement?
- Would additional data related to innovation be readily available in service sector firms and what sort of burden would collection and maintenance of such data pose for firms?
- Could enhanced service sector data help identify trends in outsourcing, collaborative networks, and shifting firm boundaries, including impacts on small firms?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## **INNOVATION DATA COLLECTION – FILLING GAPS AND REFINING DATA**

### **2. Improvement in measurement of intangibles (including intellectual property)**

#### **Description**

Statistical agencies largely focus on collecting data on firms' investments in physical capital. Little is known about firms' investments in intangible assets beyond expenditures data on R&D conducted by scientists and engineers collected by the Census Bureau for the National Science Foundation (NSF). Data on investments by firms in organizational and human capital and marketing and brand equity are scarce. Data on patent and trademark applications and assignments are publicly available, but it is difficult for researchers to match these data to data on applicants. Better matching would help researchers develop ways to put a value on intellectual property. Data are similarly scarce on the income earned on intellectual property. The Bureau of Economic Analysis collects data on cross-border royalty payments for intangible assets, but no data are currently collected on purely domestic royalty revenues and payments. Moreover, the lack of information on intangible assets' depreciation rates and how to adjust investments in intangibles for price inflation makes it difficult to estimate the wealth that is created by firms' investments in innovation. Improved data in these areas would aid the estimation of rates of return on investments in innovation.

The proposal suggests improvements in intangibles measurement through adoption of: (a) expansion of collection of data on intangible investments to include all resources devoted to innovation; (b) development of improved estimates of depreciation rates of intangible assets; (c) development of specific price indices for intangible assets; (d) collection of firm-level data on revenues from and expenses associated with licensing and transferring technology (patents and trade secrets); copyrights; franchise fees; and trademarks (e) development of patent quality indices using stock market valuations and other data; and (f) collection of data from patent, trademark and copyright applications to facilitate matching to Census and other data sets.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) consideration be given to expanding NSF's R&D survey to cover more broadly defined innovation activities; and/or (2) exploration be undertaken on how gaps and shortcomings in historical empirical measures of intangible investments and assets might be overcome; and/or (3) consideration be given to developing a new survey to collect data on firms' valuations of their intangible assets; and/or (4) consideration be given to collecting additional identifying data from patent and trademark applicants.*

#### **Discussion Questions**

- Do firms currently track their investments in intangible assets? Are such data consistent across firms?
- Could data on investments in innovation activities be used reliably to estimate stocks of intangible assets given the uncertain success of many projects?
- Can the impact of intellectual property on innovation outcomes be quantitatively measured?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## **INNOVATION DATA COLLECTION – FILLING GAPS AND REFINING DATA**

### **3. Leverage understanding of innovation through expanded sharing of and access to existing data on firms.**

#### **Description**

While the Committee has given much consideration to new or expanded surveys of firms, much remains to be learned from data that have already been collected through survey or administrative purposes. However, because of a host of laws and other restrictions affecting firm micro-data, agencies are often limited in their abilities to share data with other agencies and in their ability to provide micro-data to outside researchers.

Within the federal government, limitations placed upon the use of IRS data under the Confidential Information Protection and Statistical Efficiency Act of 2002 (CIPSEA) affect the accuracy of business registers used by federal agencies to carry out business surveys. Partially because of these inaccuracies, differences arise in how different agencies measure economic activity and have limited the impact of topical surveys by agencies such as the Federal Reserve's Survey on Small Business Finance.

Outside researcher access to business data, particularly business micro-data, collected by the federal agencies remains extremely limited. Many scholars are interested in, and with proper confidentiality training, could be engaged in research that would further our understanding of different aspects of innovation. While concerns about confidentiality are important and should be at the fore of any discussion on researcher access, current limitations on access are impeding our understanding of the dynamic aspects of the economy. Federal agencies do not have adequate funding to undertake enough internal research into all aspects of the data. In addition, advances in remote access technologies and the success of specific federal agencies in offering outside researcher access make this an opportune time to expand outside researcher access to business micro-data.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) statistical agencies be encouraged to expand data sharing activities; and/or (2) data sharing agreements consider data both on employer and nonemployer firms; and/or (3) encouragement and support should be given to agencies to expand outside researcher access to confidential micro-data while maintaining high standards for confidentiality.*

#### **Discussion Questions**

- What practices can be highlighted as examples of success in data sharing among agencies and the research community?
- Can useful research be accomplished while maintaining high confidentiality standards?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## **REFINEMENT OF THE STRUCTURE OF THE NATIONAL INCOME AND PRODUCT ACCOUNTS (NIPAs) TO CREATE A STRONGER FRAMEWORK FOR IDENTIFYING AND MEASURING INNOVATION IN THE NATIONAL ECONOMY**

### **4. Development of annual, industry-level estimates of total factor productivity.**

#### **Description**

The official framework used to estimate levels and growth rates of production, capital formation, and wealth in the U.S. economy is the National Income and Product Accounts (NIPAs) which are produced by the Bureau of Economic Analysis (BEA) using data collected by the Census Bureau, the Bureau of Labor Statistics (BLS), and the Federal Reserve Board (FRB). The NIPAs were not designed to measure innovation and its impact on wealth and productivity. This proposal advocates restructuring the NIPAs to include integrated production and capital accounts within the NIPA framework which would facilitate estimation of Total Factor Productivity (TFP) growth, a measure of how much output growth exceeds input growth and a possible indicator of innovation. The restructured NIPAs would be more easily expanded to encompass investments in innovation, leading to refined estimates of TFP and innovation's contribution to growth.

Implementation of this proposal would facilitate the development of much more detailed and reliable estimates of the contribution of innovation to economic growth. Suggested refinements include: (a) integration of the NIPAs with the BLS productivity statistics and Federal Reserve Board balance sheets; (b) acceleration of the development of the 'capital services account' in the BEA and BLS programs; (c) development of an integrated wealth account that could be expanded to include human capital and knowledge assets; and (d) expansion of efforts to incorporate quality adjustments and identify new products and services for prompt inclusion in the Consumer, Wholesale, and International Price Index programs.

Each of the suggested refinements contributes significantly to the development of much more detailed and reliable estimates of the contribution of innovation to economic growth. Furthermore, the proposed estimates would be internationally consistent, allowing for rigorous comparisons of the sources of growth across countries and over time.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends: (1) encouraging the development of annual, industry-level estimates of total factor productivity by restructuring the NIPAs to create a more complete and consistent set of accounts integrated with data generated by other statistical agencies.*

#### **Discussion Questions**

- Is TFP helpful in identifying trends in innovation or is it too backward-looking?
- Is TFP too indirect a measure of innovation to be useful for policy purposes? Can the impact of more direct innovation metrics (e.g., intangible assets) on productivity be measured?
- Is each element of the proposal equally important? Which should be done first? How much of the new proposed NIPA "architecture" is needed to improve innovation measurement?
- How critical to the refinement of the TFP estimates is the collection of new data on services?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

# REFINEMENT OF THE STRUCTURE OF THE NATIONAL INCOME AND PRODUCT ACCOUNTS (NIPAs) TO CREATE A STRONGER FRAMEWORK FOR IDENTIFYING AND MEASURING INNOVATION IN THE NATIONAL ECONOMY

## 5. Creation of a national innovation satellite account by BEA

### Description

This proposal calls for the development of a new National Income and Product Account (NIPA) innovation satellite account that would include intangible assets, such as investments by firms in research and development (conducted by scientists and engineers as well as workers in other occupations); human capital; patents and trade secrets; copyrights, trademarks and brands; and other forms of intellectual property.

A satellite account provides supplemental detail about a part of the economy using the same structure as the NIPAs without being integrated with the NIPAs. Establishing a new satellite account that is conceptually consistent with the NIPAs but based on data that are not as time-tested as those used in the core NIPAs helps facilitate the development of the NIPAs. For example, in 2006 BEA produced a satellite account for investments in research and development activities conducted by scientists and engineers; ultimately, BEA proposes to incorporate the R&D satellite account into the NIPAs.

Relatively little data are currently collected by the national statistical agencies on firms' investments in the human capital of their employees and in organizational change (two intangible assets related to innovation). Past experience with collecting such data at BLS and in other countries (notably Canada) could be used to inform the development of a survey in the U.S.

Developing a broad innovation satellite account for intangible asset account consistent with the core NIPAs -- including estimates of intangible asset capital stocks and service flows -- would introduce a broader range of hitherto omitted inputs into the NIPA product and capital accounts, further refining estimates of Total Factor Productivity and the impacts of innovation on economic growth. However, since intangible asset valuation is difficult because of the relative scarcity of directly observable prices, the data and methodological challenges are daunting.

### Potential Recommendation for Consideration by the Advisory Committee

*The Committee recommends that: (1) the data needs for an innovation satellite account be identified; and/or (2) consideration be given to reviving and updating of the Survey of Employer-Provided Training; and/or (3) consideration be given to collecting data on investments in organizational change.*

### Discussion Questions

- How likely would estimates of intangible asset stocks and service flows be sufficiently reliable to be incorporated into the NIPAs?
- How much can BEA do now and how much would the timing depend on data collection?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## **REFINEMENT OF THE STRUCTURE OF THE NATIONAL INCOME AND PRODUCT ACCOUNTS (NIPAs) TO CREATE A STRONGER FRAMEWORK FOR IDENTIFYING AND MEASURING INNOVATION IN THE NATIONAL ECONOMY**

### **6. Publish economic data based on data on firms as well as establishments to provide more meaningful estimates of employment in innovation occupations.**

#### **Description**

The Bureau of Labor Statistics (BLS) collects data by industry on the number of employees in various occupations in a survey of establishments. BLS groups the data for production establishments (e.g., manufacturing plants) separately from establishments (e.g., corporate headquarters) within the same firm that provide services to production establishments. The resulting industry statistics may not reflect how many employees are engaged in innovation activities in *firms* in particular industries. Likewise, the Census Bureau publishes statistics on the activities engaged in by employees at their firms' headquarters locations, but it does not provide such statistics by the industry of the firms.

U.S. industry statistics are generally based only on data for establishments located within the U.S. This can result in anomalous industry classifications. For example, a firm that designs and markets shoes under its own brand name but manufactures them abroad could be classified as a wholesaler; but such a firm would likely be very different in terms of innovation activities from a firm that acted solely as a merchant wholesaler (i.e., buying shoes from manufacturers and reselling them to retailers without any design or manufacturing activities).

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) annual statistics be published on employment by detailed occupation for each industry, based on data for entire firms to obtain a more holistic view of the employment of innovation workers in each industry; and/or (2) consideration be given to developing more robust methods for classifying firms (rather than establishments) by industry; and/or (3) research be undertaken on the relationship between innovation and occupational employment at firms, using firm-level microdata.*

#### **Discussion Questions**

- How should firms engaged in multiple production activities be classified?
- How and to what extent would firm-level data improve innovation measurement?
- Would firm data help reveal where innovation is taking place, by state, region, and nation? Would the movement of innovation activities be tracked?
- Would firm-level data lead to a better understanding of innovation's impact on changing firm boundaries?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## NEW INNOVATION OUTCOME MEASURES

### **7. Development of a firm-level measure of innovation intensity such as the ratio of annual revenue from products and services launched in the last three years to total annual revenue.**

#### **Description**

Several Committee members mentioned the development of a measure of innovation intensity as a useful way to track the impact of innovation. Firms would be surveyed periodically to collect data on sales revenues, in total and those attributable to products and services introduced to the market in the preceding three years. The data would be used to calculate innovation intensities for each firm in the sample which could be aggregated to arrive at publishable, industry- and economy-level measures. Researchers could also analyze the resulting firm-level data to better understand the characteristics and performance of firms with different innovation intensities.

Firms with high innovation intensities would presumably be among the most successful in designing, inventing, developing, and implementing new or altered products and services. However, there are formidable interpretive challenges. A ‘new’ product or service may be ‘new’ only to the firm and it could be difficult to differentiate truly innovative activity. ‘New to market’ in manufacturing may only capture product and service innovations; while ‘new to firm’ in service industries may be an indirect indicator of innovations in processes, systems, organizational structures, or business models.

The OECD has designed survey questions to collect data for the development of measures of innovation intensity. Several countries have implemented such surveys (e.g., the EU Community Innovation Survey), and the U.S. could build on their experience.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends: (1) an assessment of the feasibility, cost, and burden of developing measures of innovation intensity, including a review of other countries’ experience in this area; and/or (2) consideration of a pilot project; and/or (3) research to evaluate whether firms with high innovation intensities perform better than otherwise similar firms with low intensities; and/or (4) encouraging firms to develop their own measures of innovation intensity for their internal innovation assessments.*

#### **Discussion Questions**

- Is this a good measure of innovation? Would it work for all sectors? Is three years the right period of time for this assessment?
- How should new products and services be defined? Should they be the products and services new to the world? Should they be new to a geographic market? Or should they be just new to the firm? Can bright lines be drawn between these categories? And how new is ‘new?’
- How can innovation intensity adequately capture innovation by small and young firms?
- Would the data be readily available from firms? How much of a burden would it be to collect these data?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## NEW INNOVATION OUTCOME MEASURES

- 8. Development of a market share-based measure such as: (1) the share of a firm's sales attributable to newly introduced products and services in markets in which the firm is gaining market share; or (2) the extent to which a firm has a growing share in a growing market.**

### **Description**

A number of Committee members mentioned that they consider a growing share of a growing market to be an indicator of successful innovation. The proposal focuses on two possible market share measures. One variation focuses specifically on the share of a firm's new product sales in markets in which the firm is gaining market share. The second variation would measure the extent to which a firm's overall share is growing in a growing market. Shares could be aggregated into publishable, industry-level measures.

This class of measures is driven by the assumption that products and services gain market share because they provide better value by being lower priced and/or better satisfy customers' needs,.

A major issue in designing survey questions would lie in defining 'market' in a way that is meaningful for the measure and communicates the meaning to the survey respondents. And the design of a market share measure should deal with the fact that a growing market share even in a growing market is not necessarily the result of innovative activity.

### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends: (1) an assessment of the feasibility, cost, and burden of developing a market share-based measure and consideration of a pilot project; and/or (2) research to evaluate how effective the measure would be in measuring innovation.*

### **Discussion Questions**

- Would the market be defined locally, domestically or globally? Would it make a difference? Would the market be defined by a specific class of products and services, or cut across a broad set intended to satisfy a particular need? (Does a football video game compete with other video games or with other electronic entertainment devices such as computer game software, CDs, and DVDs; or with televised or live football games?) Would firms make this characterization for multiple markets?
- Would newly introduced products and services be new to the firm, new to the local market or new to the world? And how new is 'new'?
- How can a market share measure adequately capture innovation by small and young firms or in less mature or rapidly evolving markets?
- Would the data be readily available from firms? How much of a burden would it be to collect these data?
- Would market share lag so far behind investments in innovation that it would not be useful for policy purposes? What could it be benchmarked against?
- Should the focus be limited to 'growing' markets?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## NEW INNOVATION OUTCOME MEASURES

### 9. Development of a national index of innovation aggregating different measures.

#### **Description**

An index of innovation or innovation scorecard (or dashboard) could give some sense of how U. S. firms were doing on a combination of different measures of innovation. However, even among the members who supported the idea of constructing an index or scorecard, there was uncertainty as to what measures should be aggregated, how the components should be weighted, and the purpose to which the index would be put.

Consideration would need to be given as to the types of measures that would be reported and whether or not data are currently collected on these measures; whether this should be all public data or a mix of public and private information and whether or not it is something that could be done immediately or something that should be an end product following the development of new innovation measures. Such an index could be a useful tool for international comparisons if there were some comparability with measures used in other countries and if the measures selected were meaningful indicators of innovation.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) consideration be given to the development of a national innovation index when more work has been done on both data collection and analysis of innovation drivers; and/or (2) encouragement be given to firms to participate in projects such as the Open Standards Benchmarking Collaborative initiative as a means of assembling a broad range of data related to innovative activity; and/or (3) the U. S. should continue participating in the international dialogue related to innovation data collection and analysis and ensure that U. S. efforts are internationally compatible to the extent possible.*

#### **Discussion Questions**

- Is this type of index already being developed by some of the open source innovation work being conducted such as the Open Standards Benchmarking Collaborative initiative?
- What measures should be included in a national innovation index? How or would it differ from the European Innovation Scorecard or the U.S. National Science Board's *Science and Engineering Indicators* which include indicators such as: population age 20-29 with science and engineering degrees; R&D expenditures as percent of GDP; and numbers of patents?
- Do enough data currently exist to develop an aggregated measure? How would an aggregated measure improve our measurement of innovation? Can both leading and lagging indices be developed?
- Could similar indices be developed by industry and/or region?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## INNOVATION RESEARCH

### 10. Assessment of the effect of collaboration and partnerships on innovation.

#### **Description**

Collaboration and partnerships – among firms, universities, research organizations, and/or governments – were mentioned by most members of the Committee as key drivers of innovation. A number of examples were given about different types of collaboration and what they were able to achieve.

However, the issue of how to define collaboration – much less measure it – is much less clear. As has been detailed by many of the members and highlighted in the principles endorsed by most of the members, the collaborative process is more like a ‘dialogue’ than a ‘project.’ Despite the qualitative and subjective nature of much of the important information about collaboration in innovation, many members believe more can be done to measure it. Moreover, it is not clear whether collaboration fosters innovation or vice versa.

Understanding how and when collaboration works, what types of innovation are best suited to collaborative efforts, where both public and private initiatives are needed, and how collaboration contributes to innovation could foster more effective collaboration in the private sector and better government policies.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) research be undertaken to identify the key elements of successful collaborative processes that would form the basis of measurement of the effect of collaboration and partnership; and/or (2) a pilot project be instituted to measure the incidence and effects of collaboration and partnerships on innovation; and/or (3) best practice guidelines on collaborative processes be created and disseminated by industry groups and trade associations.*

#### **Discussion Questions**

- What types of data would be necessary to evaluate the effect of collaboration and partnerships on innovation? Do firms currently collect such data? Are there common definitions? How much of a burden would it be for firms to collect and retain such data?
- Does collaboration work for all types of innovation or is it limited to particular industry sectors or types of innovation?
- Should a focus be on collecting data on and measuring university/industry partnerships? Or on the changing nature of the firm?
- What methodologies exist for studying networks of professionals and firms in innovation activities? Can such methodologies yield quantitative measures of collaboration?
- Should efforts be made to assess the impact of innovation partnerships on firm boundaries and on the changing relationship between small and large firms?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## **INNOVATION RESEARCH**

### **11. Analysis of administrative records and survey data to identify entrepreneurial start-ups and study their early life cycle.**

#### **Description**

Studying the entry, growth, and exit of establishments and firms can provide important information on the characteristics of successful and unsuccessful firms. Much innovation occurs in the smallest firms, where high exit and entry rates are common. Evidence for several industries suggests that entering firms are, on average, more productive than exiting firms but the role played by innovation is not known.

The Census Bureau is developing a longitudinal business database from which it is planning to publish data on establishment and firm births and deaths, job creation and destruction by firm size, age, and industrial sector, and other measures of business dynamics over the past three decades. The resulting data will help researchers distinguish between the effects of short-term economic fluctuations and long-term effects (such as innovation) on business dynamics.

Analysis of longitudinal business dynamics data is believed to be able to provide some insight into the patterns of innovative activity in the economy and the innovative and entrepreneurial environment in various time periods.

#### **Potential Recommendation for Consideration by the Advisory Committee**

*The Committee recommends that: (1) the Census Bureau be encouraged to continue its efforts to publish reports on business dynamics; and/or (2) research be undertaken to use longitudinal business databases to describe and explain business dynamics and, to the extent possible, analyze the relationship to innovation; and/or (3) the Census Bureau explore the possibility of developing public use microdata on business dynamics.*

#### **Discussion Questions**

- Would analysis of entrance, growth and exit of firms provide useful information about innovation and the economy?
- Could innovative firms be identified through this data set?
- Would easier public access to the data encourage more analysis?
- To what extent can the emergence of new industries be studied using these data?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## INNOVATION RESEARCH

### 12. Easier access to and analysis of publicly available firm data

#### Description

The government collects a vast store of non-confidential data from firms. Analysis of such data by researchers might provide considerable new information on innovation and innovation-related activities. For example, analysis of financial data filed with the Securities and Exchange Commission (SEC) by public companies might provide insights into what differentiates firms considered innovation from those firms considered less innovative. But, until recently, such data have been locked into a format consisting of fixed blocks of text, making it difficult for researchers to process and analyze the data.

Increasingly, however, agencies have begun a process of making public data more user-friendly; for example, the Federal Deposit Insurance Corporation and other banking regulators, the SEC, and several European governments are using or testing XBRL (Extensible Business Reporting Language), a process that ‘tags’ data (i.e., attaches a standardized, searchable label to each data item filed by firms). Tagging enables ‘intelligent’ computerized recognition of each piece of information in a document, enabling accurate, automated, and flexible selection, analysis, storage, exchange, and presentation of data at high speed and reduced cost. The SEC data tagging project is still in its pilot stage but some firms are reporting tagged data. A limited database of tagged data is currently available on the SEC website and can be accessed at: <http://www.sec.gov/Archives/edgar/xbrl.html>.

Expanded use of data tagging of public information could increase transparency of public information and provide a wealth of information for researchers and other members of the public.

#### Potential Recommendation for Consideration by the Advisory Committee

*The Committee recommends that: (1) government agencies be supported in their efforts to increase the transparency of and access to public data through the use of data tagging and similar processes; and/or (2) researchers be encouraged to use publicly filed financial and other data on firms for innovation research as the data become more user-friendly and/or (3) firms should be encouraged to file their public reports in XBRL format.*

#### Discussion Questions

- How can agencies be encouraged to move faster toward providing more user-friendly access to public data? What constrains agencies from undertaking such activities?
- What types of publicly available firm data from what agencies would be most useful for innovative comparison purposes? Would researchers use these databases more if the data were more readily accessible?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?

## INNOVATION RESEARCH

### 13. Identification of drivers of and impediments to innovation.

#### Description

Many of the members suggested that the development of more effective innovation policies requires undertaking more work to get better identification of drivers of and impediments to innovation. While policy development is not the direct focus of the Advisory Committee, the Committee could identify future work that should be done in this area.

A broad variety of drivers of innovation has been identified; e.g, tax policy (R&D tax credits); education policy (promoting science and math); the availability of venture capital; the business climate; ease of entry into and exit from markets; education and skills; research and development expenditures; and specific firm culture. However, in many instances, the correlation between the identified driver and innovation outcomes is not well understood or convincingly demonstrated empirically.

Impediments to innovation that have been suggested include immigration policy, Sarbanes-Oxley rules (particularly Sec. 404), and other government regulations. As with drivers, there are many assertions but the actual impact on innovation activity is much less clear.

#### Potential Recommendation for Consideration by the Advisory Committee

*The Committee recommends that: (1) the Secretary consider convening a workshop/forum for policymakers, business leaders and academics to discuss drivers and impediments to innovation; and/or (2) research be undertaken to explore the use of different sources of available data (including tagged financial data) to determine whether there are correlations between innovative performance of firms and the existence of a new regulatory environment; and/or (3) research be undertaken to analyze the qualitative as well as quantitative impacts of specific drivers and impediments on innovation outcomes; and/or (4) firms be encouraged to participate in open standards research projects such as the Open Standards Benchmarking Collaborative.*

#### Discussion Questions

- What, if any, future work would be useful in identifying drivers and impediments?
- To what extent is there a correlation between the drivers and impediments and innovation outcomes? Would more or less innovation have occurred in the absence of these factors? Can it be measured quantitatively?
- Might drivers of innovation differ by sector or type of firm and should research be done to identify these differences? Is this also likely to be true of impediments?
- Does the Committee want to accept, reject, or modify this proposal? If action is recommended by the Committee, what would be the appropriate implementing agencies or organizations, the priority, and the timing for each action?