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OECD Innovation Project: Findings From Early Stage Scoping Interviews In The United States Final Report

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Abstract: The National Science Foundation's National Center for Science and Engineering Statistics commissioned survey methodologists at the U. S. Census Bureau to explore the topic of innovation with for-profit businesses. The motivation for this study is to inform the development of survey questions incorporating expanded definitions of innovation that specify product (goods or service), process, marketing, and organizational innovation. The Organization for Economic Cooperation and Development coordinated this and similar research studies in member countries to improve the production of international innovation statistics. Census Bureau researchers interviewed executives at 23 companies representing a range of economic sectors and sizes from very large (>5,000 employees) to very small (<100 employees). The participants generally understood the various types of innovation as intended, though they tended to have more varied interpretations of organizational innovation. Few companies reported the existence of formal innovation-related data or metrics, and varied in the availability and precision of records on expenditures and revenues that might be associated with innovation.

Keywords: business survey, early stage scoping, exploratory research, survey question development

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OECD INNOVATION PROJECT

FINDINGS FROM EARLY STAGE SCOPING INTERVIEWS IN THE UNITED STATES

FINAL REPORT

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EXECUTIVE SUMMARY

This project is a collaborative effort between the National Science Foundation and the U.S. Census Bureau, in coordination with the Organisation for Economic Cooperation and Development (OECD). The member nations of the OECD are attempting to develop internationally comparable statistics to measure innovation. For this project, there were three main goals:

1. To understand how American companies think about, manage, and account for activities related to innovation;
2. To assess comprehension by U.S. businesses of internationally utilized definitions of innovation;
3. To evaluate the availability of innovation-related data.

Between July and October 2012, Census Bureau researchers conducted 23 interviews (in-person and telephone) with representatives from U.S. businesses of various sizes and industries. Participants were executive-level representatives who had detailed knowledge of company activities.

Understanding Innovation

Almost all participants could readily offer a definition of innovation, with common descriptors, but there were many variations depending on the company and industry sector. For most of those interviewed, innovation is something that is new, unique, or significantly different. One point of particular variation in responses is to what extent innovation can be the result of improvement, which is an ongoing process for most businesses. Participants also suggested that a product that is "new to the company" but not "new to the market or industry" may or may not be considered an innovation. Many described innovation in relation to customers and in terms of market competitiveness; however few participants indicated that they spend much time thinking about innovation *per se*.

When it comes to the role of technology in innovation, although examples of advanced technology were often cited in relation to innovation, most respondents indicated technology is not integral to innovation. There were many examples of innovations that originated outside of the interviewed companies. Although innovations could be unsuccessful, many participants said an innovation needed to be fully commercialized in order to be considered an innovation. Most examples of innovations focused on products and processes, with few examples given of market innovation.

Comprehension of Oslo Definitions of Innovation

After companies described their understanding and use of innovation-related terms and concepts, international definitions of innovation were shared with business participants. Those definitions were taken from the OECD/European Union publication "Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data." Overall, participants agreed with the Oslo definitions and appeared to interpret them correctly. Most respondents provided examples of product and process innovation that corresponded well to the Oslo definitions. However, the most consistent finding is

that the concept of "significantly improved" in the definitions of product and process innovation was ambiguous to several participants. It was not clear whether or not improvements as part of "business as usual" can fit into the definition of innovation, and what degree of improvements can be considered significant.

Although most participants agreed with definitions and appeared to interpret them correctly, there appeared to be greater variation in respondents' interpretation of organizational innovation. In some cases, participants were unable to make a clear distinction between organizational and process innovation. Several participants viewed organizational innovation and process innovation as closely related concepts that were hard to separate. Some participants stated they did not think of organizational changes as innovative. Most examples of marketing innovations involved promotions, in particular adapting to the internet and other digital media.

Availability of Innovation-Related Data

Few companies maintained formal innovation metrics. Only one company had internal metrics related to innovation (new and improved products that exceeded significant sales thresholds). There were many examples of records-based metrics that may or not be explicitly associated with innovation (on-time-delivery rates, sales by product line/SKU, sales per employee, scrap resulting from production, workforce surveys). Records of innovation revenue and expenditure data are incomplete at best. Most companies track project-level expenses, but they are not tracked as innovation nor do they differentiate between innovation and non-innovation projects.

1. Introduction

1.1 Purpose of the Project

This project is a collaborative effort between the National Science Foundation and the U.S. Census Bureau, in coordination with the Organization for Economic Cooperation and Development (OECD), an international body of which the United States is a member. The U.S. and other countries through the Community Innovation Survey and the Business R&D Innovation Survey have administered various surveys to measure private sector innovation. OECD member countries are currently undertaking an internationally coordinated review of innovation measurement, from the perspective of business respondents. The main goal of this project is to understand how companies think about, manage, and account for activities related to innovation, in order to evaluate current innovation survey concepts and questions and explore the potential for expanding the types of data collected. To this end, Census Bureau researchers conducted in-person and telephone interviews with representatives from American firms of various sizes and industries. Based on the results from this and other similar projects being carried out in other member countries, the OECD will decide whether to proceed with the development and testing of draft survey questions. Results from this project will be used to inform the design of those questions.

1.2 Scope of this Report

This report is intended to support the feasibility assessment and survey question development. It contains a comprehensive summary of data collected in the interviews. Discussion of the implications of the interview results for questionnaire design is beyond the scope of this report, and will be provided in a separate memorandum from the Census Bureau researchers.

1.3 Methodology

Early stage scoping (ESS) interviews were conducted with private sector companies in the United States. ESS is a questionnaire development technique where likely respondents and other key informants are interviewed prior to questionnaire design. The purpose of early stage scoping is to explore respondents' perceptions of innovation and the Oslo survey concepts, the language they use to describe these subjects and the associated company activities, and the extent to which related data are contained in company records.

We conducted ESS interviews with 23 companies. In order to schedule these interviews, a list of potential companies was generated from the Census Bureau's Business Register using the following criteria: industry classification, company size (determined by number of employees), and location in or near one of four major cities (to facilitate in-person interviews). The 2-, 3-, and 4-digit North American Industry Classification System (NAICS) sectors targeted for this study are:

21, Mining & Quarrying
22, Utilities
31-33, Manufacturing

42, Wholesale Trade
48-49, Transportation and Storage
51, Publishing, Telecommunications, Information Services
52, Financial and Insurance Activities
5413, Architectural, Engineering, and Related Services
5415, Computer Systems Design and Related Services
562, Waste Management and Remediation

We initially identified three size classes based on number of employees: small companies (less than 500 employees), medium companies (500-5,000 employees), and large companies (more than 5,000 employees). We originally intended to include R&D activity as a selection criterion, but it proved infeasible to program the sophisticated queries needed to retrieve and match this variable across multiple databases in the time frame in which the recruiting files were needed.

To facilitate recruitment of up to 30 companies, 126 companies were initially selected from the four geographic areas in the given size and industry categories. A letter was sent to each company via FedEx Priority Mail, which explained the purpose of the project and requested their participation. Each letter was personally addressed to the company's CEO or president. A few firms responded immediately (usually to decline participation), but most required extensive follow-up efforts. We attempted follow-up calls to all 126 companies.

A first round of interviews was scheduled in July and August 2012. Initially, the companies that agreed to be interviewed were mostly medium and large companies. Smaller companies, especially those with fewer than 100 employees, tended not to respond to our contacts, and to decline our requests if contact was made. In order to include the perspectives of smaller companies, we conducted another round of interviews in October 2012 targeting smaller companies in two size categories: companies with 5-50 employees and those with 51-100 employees. We identified 40 additional smaller companies from one geographic area and sent them recruitment letters, with follow-up telephone calls. Also, 51 companies from another geographic area were contacted via telephone without a letter. We completed a second round of interviews with 10 additional smaller companies, for a total of 23 companies.

1.4 Limitations

The qualitative research presented in this report is subject to some limitations that must be borne in mind. First, companies were selected for contact purposively on the basis of size, industry, and location, and the resulting sample should not be considered statistically representative. Second, the semi-structured interview format allows for in-depth exploration of topics of interest, the relevance of which vary from company to company. For this reason, and because of time constraints, it was not possible to ask all questions in every interview. Numbers of responses to individual questions are provided for context and clarity, but not to facilitate comparisons or represent proportions of similar typologies in the target population. Further research is needed to shed light on the validity and distributions of these findings in the general population.

Our recruiting procedures focused on obtaining the participation of knowledgeable company representatives who could address each of the four types of innovation defined by the Oslo Manual (the definitions of which will be provided in section 4 below). This resulted in the participation of multiple representatives in several meetings, especially at larger companies in which the management of relevant activities is less centralized than at smaller companies. It should be noted that the social dynamics of group interviews can affect the types and quality of data, compared to individual interviews with the same persons. This is especially true when the managers or other superiors of some interviewees are present, in which case the subordinates may censor or otherwise alter their own responses and avoid appearing to be in disagreement with their superiors' positions, company policies, etc. Group interviews also present the risk that the discussion may be dominated by a minority of outspoken participants. Although in a few meetings it was apparent that some participants deferred to their superiors, their responses suggest that all interviewees were reasonably candid. We also facilitated group interviews in such a way as to maximize participation by all those present, and avoided allowing discussions to be dominated by any individuals. Group dynamics may also benefit interviews by providing opportunities for individuals' contributions to be corroborated or contradicted, allowing researchers to get a sense of the variation in ideas held by multiple participants. This said, we generally perceived that individuals' ideas were shared by other interviewees.

2. Company Profiles

2.1 Industries Represented in Study and Types of Participants

The following table summarizes the types of companies in our sample by industry (2-digit NAICS) and size in terms of domestic employment:

Sector	Number of employees				
	<100	100-1,000	1,000-5,000	>5,000	Totals
22, utilities		1		2	3
32-33, manufacturing	4	1	1	1	7
42, wholesale		1	1		2
48, transportation		1			1
51, information	2		1		3
52, finance	1			2	3
54, professional services	3	1			4
Totals	10	5	4	4	23

The 36 company representatives who participated in the interviews are mostly senior or executive managers with knowledge and experience that span the breadth of their companies' activities. They included presidents and CEOs (6), vice-presidents (13), directors (12), and other managers (4). The executives and directors oversee areas including administration, strategy, information technology, human resources, R&D, operations, finance, quality, continuous improvement, engineering, customer services, marketing, sales, supply chain, product lines, and production. Three had "innovation" in their titles.

3. Company Perspectives on Innovation

The interview participants were initially asked to provide their definitions of innovation. Most of these responses were elicited prior to any other discussion of the types or characteristics of innovation, and are therefore assumed not to have been influenced by the Oslo definitions. However, a few interview participants recalled the letter that was sent to their companies, which described the types of innovation that we wished to discuss in the interviews, and so the letter may have influenced their statements.

3.1 Definitions

All but one interviewee readily offered a definition of innovation, though a few commented on the task of defining the concept. The reticent interview participant, who described himself as not very articulate, said he was not sure what it means. Others said innovation is "tough to define" and is "broad." Another said, "'Innovation' is widely used, but it doesn't mean much to us until the specifics of the applications are defined" (i.e., the specific meaning and characteristics of the term are communicated).

While the definitions offered by interviewees contained many common descriptors, they also contained many variations and divergent components, as will be described in detail in the sections below. Several interview participants provided qualifiers generally indicating that innovation implies something new, unique, or significantly different, e.g.,

- "To be unique, to create something."
- "To be on the leading edge and ahead of new ideas."
- "Something that has never existed before."

Alternatively, other interviewees noted that innovation is something that, as one stated, "improves on what currently exists."

Other responses were somewhat more precise in terms of how innovation is defined, evaluated, and operationalized:

- "It drives a change of behavior."
- "A novelty that enhances the user's experience."
- "There is a new product aspect, but also processes and methods to make them faster and easier."
- "Innovation is new technology, or the new use of a current technology."
- "Innovation is new and provides value. It must succeed in the market, make money. It must be big. It must secure a proprietary position for the company."
- "A differentiating technology that provides value to the customer and allows the company to grow in new ways."

This initial discussion of the company representatives' definitions of innovation resulted in several emergent themes, which are described below. Pertinent comments and observations elicited in later parts of interviews are also included, and are specified as such.

3.1.1 Outcomes, Rewards, Benefits, Risks

Several respondents defined innovation at least in part in terms of outcomes, rewards or benefits resulting from the innovation. Eight mentioned various combinations of lower cost, faster delivery or completion, and improved efficiency, reliability, and performance of products and processes. Two said an innovation should or must produce revenue. Another said simply that an innovation would provide value, and two said that an innovation must be successful. Others described innovation as something that would allow their company to grow in new ways, and as being associated with progress.

Some smaller companies said that, with regard to innovation, they avoid risk. For example, representatives of a newspaper said they thoroughly research new news products and delivery channels before implementing them, so they can be sure of success. Similarly, the electrical equipment manufacturing interviewee said, "We have relatively few engineers focused on one best platform. It's a difficult industry, we can't innovate too much. It requires large investments, and the finance community doesn't want to take on risk."

By contrast, an executive at a large company described the relationship between innovation and risk this way: "Innovation is bringing something new to market, whether the client desires it or not. Clients could say, 'It would great if you could do this, that would be innovative.' More challenging is if you come up with something the client doesn't ask for and you take the risk." Congruent with this notion of risk, two other interviewees stated, respectively, that innovation "requires trial and error," and "You can't have success without some failures."

3.1.2 Competitiveness

When asked initially to describe what "innovation" means to them, seven respondents associated innovation with competitiveness in their markets or industries, saying things such as:

- "An innovation must secure a proprietary position for the company."
- "We're trying to be leaders in our industry."
- "We always try to…be the best in our marketplace."
- "We need to innovate to stay competitive and viable."
- "[Innovation means] taking known concepts to the limit, so we're one step ahead of the competition."
- "Innovation means doing something different from how everyone else does it."
- "Innovation means delivering products or services to the marketplace in an improved way, that solves a greater business need than can be found in the marketplace."

Others said an innovation must make the company unique or distinguish them in their markets. One respondent described an innovation as something that puts the company "on the leading edge and ahead of new ideas."

3.1.3 Customers

Eight interviewees described innovation in relation to their customers. Four of them said an innovation would be a new way to help their customers meet their needs, solve a problem, or accomplish their goals. Interviewees at two companies took this idea a step further and introduced the idea of an innovation letting them anticipate their customers' needs before the customers themselves do. Others described innovation in terms of providing value to the customer and keeping the cost to them as low as possible.

3.1.4 Types of Innovation

A majority of our interview participants (13) described innovation in terms of specific types that generally corresponded to the Oslo concepts of product and process innovation. The words "product," "service," and "process" were used in all such descriptions, and no other terms were used to describe the types of innovation. Some interviewees described having multiple types of innovation simultaneously and made clear distinctions between them.

3.1.5 Role of Technology

Eleven interview participants defined innovation as involving technology, though only two indicated that technology is integral to innovation. Four interviewees described use of innovative technology specifically in the context of managing or improving their processes. One described an innovation as "a differentiating technology," i.e., something that would make a company stand out in the marketplace. Another interviewee defines innovation as "staying trendy with changes" in their end-users' use of technology.

When asked in later parts of the interview whether innovation must involve the use of technology, nearly all interviewees (except two, as mentioned above) said it does not, including those who cited examples that involve technology.

3.1.6 Innovation from External Sources

Five interviewees volunteered that, as one stated, something "can be borrowed and innovative". One who said his company tends to adapt innovations from outside offered the example of lean manufacturing strategies. Another said they innovate "usually by adopting what the large companies do." Another specified that "sometimes we have to buy our innovation."

Besides being acquired through purchase or imitation, the representative of a transportation company said an innovation came in the form of new routing software required by the agency which is their principal customer. Other interviewees similarly said that innovations came from

outside sources such as the company that facilitates their brokerage business, and the company's corporate headquarters.

When asked whether innovation must originate inside the company, nearly all said that it does not, but can be brought in from outside.

At a later point in the interviews, three interviewees were asked to define the phrase "new to market" and to describe the difference between an innovation that is new to their market and one that is new to their company. All three responses shared the idea that something that is new to the market "hasn't been tried before." One went on to add that "the technology may exist but it has not been applied." Another said that something could be innovative without being new to the market, "but it's called playing catch-up," a notion shared by a few other interviewees whose companies value innovation as a means of staying ahead of their competitors.

3.1.7 Innovation Management and Strategy

Seven company representatives referred to their companies' management of and strategies regarding innovation, or lack thereof. One spoke at length of his company's active management of innovation and integration into their business model. Previously in this company, innovation was managed from the top down. As a result, good ideas from lower employees were often overlooked, or were isolated within parts of the global company. Now innovation is encouraged in all parts of the company, and ideas are solicited and shared via a corporate social media application.

One interviewee cited Clay Christensen's (of the Harvard Business School) three types of innovation (efficiency, sustaining, disruptive), and said that his company is starting to explore disruptive innovation (a few other interviewees also mentioned Christensen or other originators of business management theory regarding innovation). Another interviewee said his company "embraces" innovation, for example, by staying abreast of new technologies, attending trade conferences, and meeting with industry leaders and suppliers. Another said simply that the company challenges employees every day to come up with faster, better and cheaper ways of doing things.

On the other hand, one participant said that in his company, innovation is "an evolving notion; we are just starting to organize ourselves around innovation." Another described innovation processes in his company being more about "tribal knowledge, not a formal business process."

As noted above, several interviewees noted the importance of innovation in remaining competitive in their respective markets. A few provided more details on the role of innovation in their companies' business strategies. Interviewees at a manufacturing company said that developing new products is a priority, as they can be marketed at a higher price than existing or improved products. At a later part of his interview (after the introduction of the Oslo definition) an executive at an electrical generation company said the Oslo definition of process innovation

describes "our management model," which he elaborated as the ability to produce the same or more product with lower capital costs. Also during discussion of the definition of process innovation, an interviewee at a manufacturing company said an innovation must align with the company's long-term strategies, e.g., reducing lead-time in production processes.

Interview participants at three customer service-oriented companies discussed innovation in the context of their companies' business models, which two of them described as "customer intimacy" models. Innovation is important for these companies because it provides them the flexibility to offer a wide variety of services, to serve customers' needs. One said their goal is to make themselves "irreplaceable" by taking on aspects of production and processing that their clients do not want to do themselves while maintaining good control over costs. Another said his company, which performs contract manufacturing, strives to serve a variety of customers ranging from those that want bulk manufacturing to those looking for more tailored products. Other interviewees made similar comments about the role of innovation in providing the flexibility to maximize their opportunities and potential solutions to their own and customers' problems and challenges.

3.2 Innovation vs. Improvement

Most interview participants generally indicated that "innovation" is not the same as "improvement", and offered several characteristics and contrasting examples to distinguish the two. One of the distinguishing characteristics of an innovation is that it is new or unique: "Innovation means to be unique, to create something; while improvement means the addition of a new feature." Another said, "Innovation is a different way to do things… Improvement is making the same process better." Others qualified an innovation as being a "radically different" method for producing the same product.

Others said what distinguishes an innovation is its impact: "Innovation differs from improvement in impact. Improvement is incremental, marginal improvements. Innovation is not incremental." Another said that an improvement has to have a "much greater impact" to be considered an innovation. Another described the difference between innovation and improvement as being quantitative versus qualitative: "An improvement is, e.g., by 5%. It's quantitative, a measurable change. Innovation is improving the quality, a major change."

Some interviewees offered examples to illustrate the differences between the two concepts. One interviewee said an improvement would be using an existing inventory management tool in order to carry less inventory, whereas an innovation would be finding a creative way not to carry inventory at all. Another said that "improvement" means adopting something that already exists, e.g., an upgrade to faster servers, whereas the innovation was installing their first server, or their first link to mainframe via modem in another state prior to that. This person said, "Innovation makes a radical improvement, and is not just marginally more efficient." Another contrasted the redesign of their newspaper's website, considered an improvement, with the development of their first website, which is an innovation for them. She went on to say that "an

improvement can be innovative if it creates another need, for example with the website redesign, if the readers say they want video features, not just articles." Similar to this, another interviewee cited the example of reading a magazine on a portable electronic device:

> "It's the same activity, just a new delivery method. Though it improves the speed of delivery, does it fundamentally change the experience? The real innovation was when reading material became available on websites, which introduced changes to reading behavior, advertising, and accountability, how to demonstrate to advertisers how many people see their ad. Electronic delivery allowed web providers to track and measure users' behavior. This changed how magazine publishing was done."

It should be noted that, though most interviewees saw the two concepts as distinct, several qualified the distinction; as one said, "I'm not sure we draw a line." Another interviewee stated, "Innovation is in the eye of the beholder."

Three interviewees indicated that they see innovation and improvement as related. Two made similar statements, to the effect of "innovation could be something relatively new or incrementally different." Another said, "An innovation may be achieving a different result or benefit, or getting the old results from a new method."

Two specified that as their companies practice "continuous improvement," "innovation" is not so meaningful to them. One said, "Our company's business model is primarily focused on continuous improvement and much less on innovation. Numerous continuing improvements can amount to large gains over time."

During later parts of the interviews focusing on the Oslo definition of process innovation, several interviewees made statements in which they equated innovation with continuous improvement. For example, one said, "Almost all our innovations lean toward process… We've been reviewing our work processes and trying to make them more efficient." Others noted that, "We're constantly tweaking for more efficiency" and "We are constantly refining how we process transactions." Another interviewee similarly said, "We have a lot more innovation in terms of process development… With our lean implementation, we're always working on process improvement." However, this was the only interviewee to distinguish between improvement and innovation, saying what they do is generally "continuous improvement, not necessarily innovation."

3.3 Unsuccessful Innovations

Several interview participants provided examples of innovations introduced by their company that were not successful. These generally fell into four categories:

1. Failing to understand adequately the intended customers or markets. Two interviewees described consumer products failing because of inadequate market research. Similarly, a large manufacturer developed a new version of an input for its client's product, but

the client was not interested in its innovative properties (related to being environmentally friendly) because it did not make a positive impact on its own manufacturing processes, and may have added cost to adjust their processes. This interviewee said the product failed because they did not fully understand the nuances of their customer's processes. Two other companies said their innovative products failed because their products were overly complicated and difficult to use, or did not function the way end-users expected them to.

2. A product was eclipsed by a competitor's superior product, or a competitor got to market first with a similar product. Four interviewees said their innovative products failed because a competitor got their own innovative product to market first, or the competitor's product eclipsed their own.
3. Problems with distribution. One interviewee said an innovative product failed because the company botched the distribution of it.
4. Purchased software that did not perform as expected. Two respondents described investments in software packages that were intended to be innovative but that did not perform as expected.

Three companies said they had innovations that were initially not successful, but were not considered failures because they contributed knowledge that could be successfully applied later.

3.4 Examples of Innovation

Interview participants at every company were asked to provide examples of what they considered innovative activities or products from their companies. Nearly all of the examples provided related either to products, services, or processes, and a few corresponded to marketing strategies. All the examples listed below were identified by the respondents as "innovations," but some were for the most part straightforward adoptions of practices from other companies and industries. Note that these examples were elicited prior to our presentation to interviewees of the Oslo concepts.

3.4.1 Product Innovation Examples

Several respondents provided examples of product innovation, including the following:

- Reducing the weight of public transportation seating, in response to new Federal guidelines
- Adapting a more robust support structure construction method originating in another industry
- Developing a new type of medical waste container
- Improving the design of a proprietary product with fewer parts to facilitate more efficient manufacturing and assembly
- Creating a portable version of a chemical detection device for law enforcement applications
- Designing a new machine to facilitate recycling of household products at, e.g., grocery stores

- A proprietary component allowing food production machinery to overcome a specific challenge
- Information service products that aggregate price quotes from insurance brokers to provide more up-to-date information about the market
- Providing in-house assembly service to deliver "turn-key" products, rather than requiring customers to assemble them
- Creating new health insurance exchanges for client companies' employees, in response to the Affordable Health Care Act

As noted above, three interviewees offered similar examples of what they described as innovative services, which two of them referred to as "customer intimacy." This was described as being intimately aware of clients' business needs and maximizing the types of services available to them. This type of example may be more of an innovative business model or strategy than an example of product innovation per se.

3.4.2 Process Innovation Examples

Several examples related to business processes were offered. One was the adoption of a new manufacturing process, specifically learning to make products using a material that improves the quality of products but is difficult to work with.

Several interviewees gave examples of process innovation that dealt with efficiency, such as:

- Reducing the number of transactions involved in production
- Using smaller vehicles for public transportation, which are smaller and therefore easier to operate and maintain
- Routinely replacing power grid infrastructure with newer and better technology which, for example, enables more precise monitoring of voltage flows
- Increasing electrical generation plant efficiency (no specific example given)

Others gave examples related to the acquisition of new software or computers:

- Placing navigational computers in public transportation vehicles to replace human dispatchers
- Updating equipment and software used for the design of magazines and other media
- Adopting new software to manage sales activities
- Adopting new warehouse order fulfillment and delivery routing software
- Remote computing for employees
- Using a "server farm" to run large computations, like market simulations
- Building-design tools that became available with the advent of computer-aided design
- Going paperless – software that creates paperless invoices, fillable pdf's, and fax-over-internet (cited by two companies)

3.4.3 Marketing Innovation Examples

A few examples were given that were related to marketing activities:

- "Flat-pricing" in public transportation – charging an average fare for all rides, rather than based on the duration of each trip
- Adding a "pay-wall" to a newspaper's website, i.e., charging for full articles that had previously been offered at no charge
- Together with the above example, the newspaper's managers considered the creation of Twitter and Facebook accounts as in tandem with the "pay-wall" to be innovative.

3.4.4 Miscellaneous Example

One interviewee offered the example of his company switching to a new health insurance provider to provide more choices for its employees. He called this an "organizational innovation."

3.5 Records and Metrics Used to Evaluate Innovations

The exploration of company representatives' a priori perspectives on innovation (i.e., before they were presented with the Oslo concepts) concluded with a discussion of the types of records associated with the examples they provided, and any metrics they may have used to evaluate the success of the examples. It should be noted that these responses came only from the second round of interviews, per the revised protocol, which were conducted with companies having fewer than 100 employees. Additional information about records of innovation-related expenditures and sales (elicited after introduction of the Oslo concepts to interviewees) is provided in Section 5.

Examples of records-based metrics—that may or may not be explicitly associated with innovation—that interviewees provided include:

- On-time-delivery rates
- Sales by product line/SKU
- Sales per employee
- Scrap resulting from production
- Workforce surveys

The representatives of a newspaper publishing company offered the following examples:

- Numbers of copies sold
- Web analytics, such as click-through rates (i.e., clicks on advertising links), page-views, and story clicks (i.e., clicking through from a free article summary to continue reading the full story for a fee)
- Numbers of Facebook and Twitter followers
- Fees for online services

Other company representatives said they only evaluated the success of their examples of innovation using qualitative and/or subjective measures. For example, the publisher who upgraded to new equipment said the upgrade was considered successful as determined by the seamless implementation, and the fact that designers use it. Interviewees at a small financial services company said they consider the implementation of remote computing successful, as determined by the fact that their people can get their jobs done while out of town, timely, efficiently and securely. They have no formal metrics, just the subjective judgment that working processes are maintained or enhanced. When probed about the example of providing in-house assembly service, the participant said it was considered successful, as determined by the fact that the customer had asked for it and it helped make the sale. Another interviewee said an innovation was considered successful based on the fact that the company is more profitable.

4. Reactions to the Oslo Definitions

Following the discussion of interview participants' own definitions and examples of innovation, they were provided with each of the definitions of innovation from the Oslo Manual and asked for their comments on each. They were asked whether each definition matched any of the examples they provided previously and, if they did not correspond to their prior examples, to offer additional examples that would match each definition. Refer to the interview protocols in Appendix B for details about the order of topics and questions during the interviews.

4.1.1 Responses to Oslo Definition of Product Innovation

The Oslo definition of product innovation we used in the interviews reads as follows:

> The introduction of a good or service, which is new or significantly improved with respect to its characteristics or intended uses.

Virtually all interviewees stated their agreement with the Oslo definition of product innovation, although a few expressed concerns about particular aspects of the definition (see section 4.1.2). Interviewees were asked to share their interpretations of the definition, which resulted in a variety of descriptors and criteria.

Several interviewees' responses correspond to the portion of the definition referring to "characteristics or intended uses." One such interviewee said a product is innovative if it "changes or improves the end-user's behavior." Another interviewee said the definition of product innovation means "to change the character of a product to make it more widely useful, improve its functionality." He cited the example of the cash register, which started as a device that manages cash and tracks purchases but evolved beyond its original purposes to handle credit card transactions and track inventory. Other interviewees described product innovation in terms of measures of performance (e.g., quality, reliability, and efficiency), timeliness of delivery, and cost effectiveness.

Other responses to the product innovation definition varied, and were simpler in that they each articulated only a single specific aspect of the concept. These responses describe product innovation as:

- New ideas for products that produce revenue
- Must be profitable and in demand
- A product that customers will eventually need but do not realize it yet
- New to the company but not necessarily new to market
- Could be developed as part of the continuous improvement process

In addition, most interviewees affirmed that a product innovation could result both from a new good or service as well as an improvement to an existing product.

4.1.2 "Significantly Improved"

The inclusion in the product innovation definition of the qualifier "significantly improved" appears to be the sole contentious aspect of the definition. Although no one took issue with the notion that a product innovation could result from a significant improvement (as opposed to restricting it to new products), five interviewees indicated that the term is ambiguous. One said that "significantly improved" means "materially different," but that "it depends on how you measure it." Another said that the term could have different meanings for different businesses. One interviewee said that the idea of a product being significantly improved "requires some kind of measure." Similarly, in regard to the definition as a whole, one interviewee said, "It's silent as to result. Innovation has to get a result."

4.1.3 Product Innovations: Goods vs. Services

Although most interviewees indicated no problems with the idea of a product innovation in terms of a service, a few did. One, whose company develops new high-tech products, had a hard time grasping the idea, and could only relate to services in the context of, e.g., psychological health counseling services. Another interviewee, at a small financial services company said the definition made sense but she was not sure she could relate it to financial services. It should be noted that in the latter interview, the other company representative participating in the interview had no trouble applying the definition to their company and offered several relevant examples.

4.1.4 Examples of Product Innovation

In the discussion of the Oslo definition of product innovation, interviewees were asked for examples corresponding to the definition. This elicited several new examples, as well as reiteration of several examples provided earlier during the discussion of interviewees' own perspectives on innovation. A few offered expansions on the examples they provided earlier.

New examples of product innovation were offered by the representatives of the two publishing companies. The newspaper publisher cited the following as product innovations: their original

website (i.e., when the internet was still fairly new); special-interest sections of the newspaper (e.g., wedding planning, etc.); their publication of a new print magazine; and their operation of a TV news channel. The periodical and contract publisher's examples of product innovation included their first digital publication of a new title when digital publishing was new; and more recently, producing and posting to the internet videos, e.g., interviews with client associations' members.

Some new examples of service-related product innovations were given in response to the Oslo definition, along with reiterations of previous examples. The new examples include:

- "Demand response" which allows residential customers to reduce their electricity consumption at times of peak demand
- Reducing turn-around times on providing quotes to customers to three days (from a contract manufacturer)

In addition, interviewees at two other companies provided additional examples to those they gave prior to discussion of the Oslo definition. The metal distributor offered several specific examples that expand on the "go-to-market" services mentioned in the first part of the interview, including supply chain management (SCM) and SCM information management services; "just-in-time" delivery (which he said was new to them but not new to the industry); and collectively interfacing with customer-companies from the same corporate group, rather than dealing with each individually.

The representatives of the small financial services company gave a more specific example of the remote computing example they provided earlier, namely using a cloud-based service for the purpose of accessing files and programs, to facilitate remote work. It should be noted that they also associated this innovation with the definition of process innovation later in the interview, which suggests that the distinctions between product innovations and process innovations may not be completely clear for some types of activities, at least until both definitions have been read and processed. These interviewees also provided other examples in response to the product innovation definition: allowing clients to look at their accounts online (a service that is actually provided by the unaffiliated financial services company under the auspices of which they operate); using online conference call services to have online meetings with clients; providing clients with audio recordings of financial review meetings for reference; and providing "quick and dirty" retirement reviews as an alternative to developing full financial plans. The latter two examples seem to blur the line between goods and services.

One company representative (whose company provides public transit services), reiterated the several examples he gave prior to the Oslo definition discussion, namely his company's use of smaller vehicles, use of mobile data terminals, its pricing strategy, and its focus on a particular market segment. It should be noted that these examples are not congruent with the definition of product innovation, although when he was later provided with the other Oslo definitions of process innovation and organizational innovation, he was able to apply them correctly to his examples.

4.1.5 Records and Metrics Associated with Examples of Product Innovation

Several interviewees provided examples of metrics or data contained in records associated with the product innovations elicited during discussion of the Oslo definition. Interviewees at a power generation company said they could identify costs (and resulting savings) associated with "demand response." The representatives of the other public utility company we interviewed corroborated this, saying that as a result of regulation they have detailed cost/benefit metrics and other financial data related to their existing and new products and services. A contract manufacturing company representative said they track metrics related to employees, customers, and shareholders, all of which have a time element. He said they prepare a weekly "dashboard report" that contains, e.g., new quote turnaround time, levels of service provided to customers, order through-put time, returns, inventory, and deviations in product quality. Another manufacturer said their material costs were measurably reduced thanks to the use of a new type of material in its product. This interviewee also said that sales of this product increased but were also affected by other factors, making it difficult to precisely measure the impact of the innovation. The representatives of the newspaper and the publishing company described similar types of metrics, including fees paid for web hosting; pricing models such as fee per issue and per page; percent of revenues resulting from advertising; revenue for each issue; and web analytics such as the top 20 most-read articles each week, numbers of page-views ("impressions"), click-throughs, numbers of unique visitors, etc. The publishing company maintains historical data back to the start of their magazine.

As described in section 4.5, one company's employees said they evaluated the effectiveness of their innovative activities mainly using subjective judgments. The representatives of the small financial services company said they do not use metrics to gauge the effectiveness of their new services, but mainly feedback from clients. "But if it took off and we did lots of them and other similar services, that means it's successful."

4.1.6 Feedback on the Proposed Metric for Product Innovation

Interviewees at five companies were asked to comment on the proposed metric "sales from new vs. significantly improved products and services, new to the market vs. new to the company." Given the complexity of the metric, interviewees were initially asked to comment on the first part, "sales from new vs. significantly improved products and services," before being asked to apply this distinction to "new to the market vs. new to the company." Three of the five said they had no trouble distinguishing sales of new products from those of improved products. One said he had seen this metric used before in other companies and referred to as a "sales vitality index." A fourth interviewee said he can readily isolate new product sales, but said, "If it's an existing product with an innovation, it may be difficult to gauge what is attributable to that innovation." This was the same interviewee cited above, who said that product sales are affected by other factors than improvements to them, and these factors are difficult to parse out. This interviewee also said that he would not be able to distinguish between innovations that are new to the market and those that are new to the company, as his company is "basically focused on the bottom line. It takes a year or two to gauge the success of a new product." The

fifth interviewee said he "struggled" with the distinction between sales derived from new vs. significantly improved goods because they sell customized equipment tailored to a small marketplace, and are constantly working to improve their products and services. Because of his answer to the first part of the question, and also owing to his previous statements about his company striving to be a leader in its industry and to being short on time, we did not follow up with the second part with him.

4.2.1 Responses to the Definition of Process Innovation

The Oslo definition of process innovation we used in the interviews reads as follows:

> A new process is the use of new or significantly improved methods for the production or supply of goods and services.

The Oslo definition of process innovation clearly resonated with most interviewees. All but one stated that they agreed with the Oslo definition. Most interviewees who offered their own definition of process innovation used some variation of "doing things differently so they are better, smarter, faster, and more efficient," though a few offered more specific characteristics of process innovation. One noted that the company's interest in process innovation "is to assure that the company product offerings provide the best quality and have the lowest cost." Another defined process innovation as "the ability to produce the same or more product with lower capital costs." Another specified that process innovations allow production tasks to be eliminated and reduce the amount of time needed.

Interviewees from at least six companies thought of process innovation as the result of process improvements. Two used the term "continuous improvement" in association with process innovation and improvement, although a third distinguished continuous improvement from innovation. Others made equivalent statements, e.g., "We are constantly refining how we process transactions," and "We're constantly tweaking for more efficiency." A few also said that more or most of their innovations are process innovations.

The lone dissenter with regard to the adequacy of the Oslo definition of process innovation is the same interviewee described in section 5.6 who "struggled" with the definition of product innovation. He explained his difficulty in associating his company's activities with innovation as due to the fact that his is "basically a company of engineers" continually focused on improving their designs, the manufacture of which is outsourced (he described their machinery production as "light assembly work"). He also took issue with the word "process," which is salient to him in the context of the food production processes of the machinery they create, and does not suggest the company's processes of designing and building the machines. He recommended using a more specific term like "process of making machinery."

4.2.2 Examples of Process Innovation

The interviewees who volunteered process-related examples of innovation earlier in the interviews generally reiterated those examples in response to the Oslo definition, and several

other examples were shared as well. Most examples involved the introduction or use of technology (mainly IT) to improve the speed and/or efficiency of processes. These included:

- Building a database to monitor and coordinate power grid-maintenance personnel and activities
- Acquiring inventory purchasing software that allows them to forecast future needs and auto-populates purchase orders
- Adoption of vehicle routing software
- Changing to computerized design in publishing
- Transforming trading activities from face-to-face to telephone-based to computer-based
- Use of electronic data interchanges in manufacturing plants to streamline communications and management decision-making
- More efficient batch processing to eliminate duplication and reduce cycle times
- Remote computing to facilitate employees working off-site
- Using cloud-based computer resources

New examples of process innovation that did not explicitly mention the introduction of technology include:

- Product fabrication that makes better use of the available material and results in less scrap
- Measuring manufacturing scrap as a management parameter
- Using higher stacks of pallets to make better use of warehouse space

A few examples were given that do not appear to fall within the scope of the process innovation definition. One such example was the leasing of computers instead of purchasing them. More significantly, interviewees at two other companies described the introduction of management processes to facilitate process improvements. One was called a "total quality action team," described as a group made up of people from various parts of the company who meet to share knowledge and experience and identify opportunities for improvement. The other was described as a "toll-gate" process using formal criteria, milestones, etc., intended to facilitate the selection of improvement projects to capitalize. Neither of the latter two examples were reiterated in later discussions of the definition of organizational innovation.

4.2.3 Records and Metrics Associated with Examples of Process Innovation

Interviewees at larger and/or process-oriented manufacturing, wholesale, transportation and finance/insurance companies reported continuous and ongoing analyses of and improvements to their business processes. The large insurance company's representative said they use Six Sigma to analyze their processes. Two of the manufacturers described similar process-analysis methods such as critical-path maps, office mapping, and "spaghetti maps" to identify bottlenecks in processes and reduce the amount of paperwork associated with manufacturing processes. Time-of-completion for various steps and tasks in production processes was also

frequently mentioned. The representatives of a local newspaper said they track expense for employees' time, and also measure production costs in terms of price per published page. He also said that when they introduced digital publishing processes in the past, they were able to measure cost savings in terms of employees' time and materials.

The interviewee at a small financial services firm said he tracks technology-related costs, including what is spent per employee.

By contrast, when asked whether he used any metrics to evaluate the implementation of remote computing, the interviewee at the small publishing company said he did not, and that it is "more of a morale issue. People like it."

4.2.4 Process vs. Service-Related Product Innovations

Two interviewees were asked to comment on the difference between activities related to processes and those related to services. Both were able to provide examples to distinguish between the two concepts, and both said that the distinction is clear to them. Although one provided examples of services that were explicitly process-related (holding inventory for a customer, providing faster shipping through third party shipping provider), both described their examples in the context of providing services to their customers, and indicated that this latter consideration was significant for each of their examples.

4.3.1 Responses to the Definition of Organizational Innovation

The Oslo definition of organizational innovation we used in the interviews reads as follows:

> An organizational innovation is the implementation of a new organizational method in the firm's business practices, workplace organization or external relations.

Most of the interview participants said they agreed with the Oslo definition, though few provided definitions of their own. Three defined organizational innovation in relation to some other company activity, e.g., "a major process roll-out," "our lean manufacturing implementation," and "to support other improvements in company performance." One clarified his notion of organizational innovation relative to new processes by saying the innovation need not involve "a grand plan for the company structure, but [rather] key roles."

A few others said their typical organizational changes were "not necessarily innovative" but were adapted first by other companies in their industries. They cited examples of non-innovations such as centralizing the finance function into a shared services organization, removing a redundant management layer, redefining responsibilities, and creating joint ventures and partnerships. Echoing earlier statements regarding innovation generally, one said, "I see innovation as something that hasn't been done before." However, these interviewees all shared what they thought were examples of organizational innovation. Another interview participant unequivocally did not view the idea of organizational change as related to innovation

at all, but merely as improvement, saying that there was no "hard work" involved, nor any tangible by-product of such changes.

There were a few interviewees who indicated they were not clear about the definition of organizational innovation or some portion of it. One said he was not sure what is meant by "method." Two others related the concept to business practices, describing it as "basically a business model to serve your market better," and "innovations that focus on how to provide the best customer service, like adding a new customer to the existing market."

4.3.2 Organizational Innovation vs. Process Innovation

When asked whether there is a difference between organizational innovation and process innovation, three interviewees gave similar responses to the effect that the two concepts are closely related. One said, "They go hand-in-hand. Processes support function and vice-versa." Another said that when a company changes a process, it also must change its organizational strategies, and that the two are complementary. A third said, "They're similar. Organizational innovation is more about 'who' and process innovation is about 'how.'" This person went on to elaborate that "'Who' can mean number of people and skill sets," which suggests that a fairly broad range of company activities and features can be covered by this interpretation of organizational innovation.

Two other interviewees described organizational innovation as more distinct from process innovation. One said that "process is related to production or outcome," while "organizational innovation has much broader effects, across the organization." Another said, "There is a clear difference between process and organizational innovation. Process is manufacturing. Organizational is, for example, the way the departments relate to each other, such as through their communication systems, which were revolutionized by email." Finally, when asked to describe the difference between the two concepts, another interviewee said, "We wouldn't spend a lot of time trying to separate what you term process and organizational innovations – they are too much the same thing in our business space."

4.3.3 Examples of Organizational Innovation

Many more examples of organizational innovation were offered than definitions. A plurality of the examples involved the organization or management of business operations:

- "Horizontal" management structure which allows resources to be moved according to the needs of the firm, and also allows for a "big picture" approach in which regional managers are accountable not just for the success of their regions, but also for supporting other regions
- Creating management positions to handle contract publishing and proprietary titles individually
- Creating "service teams" led by "client relationship managers" to eliminate duplication of effort and ad hoc delegation of assignments, provide another management level,

formalize informal working relationships, clarify responsibilities, increase accountability, give clients specific points of contact, etc.
- Changing manufacturing operations to "cellular" organization to promote "single-piece flow" and build products faster and with less inventory
- Implementation of a new sales model which provides customers with maximum flexibility and all possible "go-to-market" strategies (cited earlier)
- Moving a segment dealing with insurance into another segment that provides brokerage services to improve distribution and client coverage

A few examples specifically involved the management of innovation-related activities (perhaps because they were the subject of the interviews):

- The company operates as an organization of entrepreneurs, in which ideas are developed by collaborative teams and then presented to managers for approval
- Creation of cross-functional teams to develop new ideas, with increased accountability of each component
- Global organization of R&D function to facilitate global cooperation and results

One example specifically involved company management, and was described as "experiments" with expatriates from the foreign parent company filling management roles in a domestic subsidiary.

Several examples involved some form of training or mentoring:

- Manufacturing workforce skills assessment, gap analysis, and targeted training (cited earlier)
- Focus on public transportation drivers' on-time performance and safety records, and provide them with more one-on-one attention and training
- Pairing senior staff with junior staff in mentor relationships
- Employee training (no further details provided)

Finally, one company representative provided the example of his company's focus on specific markets, e.g., aerospace, heavy industrial, etc.

Two other interviewees provided what they considered to be examples of organizational innovation that appeared to be out-of-scope of the Oslo definition:

- Providing expanded health insurance options for employees by switching providers (cited earlier)
- Buying new energy-efficient equipment
- Using Google Mail and Google Docs instead of printing documents

4.3.4 Records and Metrics Associated with Examples of Organizational Innovation

A few interviewees said they could provide records-based evaluations of their examples of organizational innovations. At the manufacturing company where the workforce assessments and targeted trainings were implemented, the interviewees said they were able to compare the quality of the production output before and after the trainings. Another manufacturer repeated similar production-related metrics he had given previously, namely order-through-put time (the time from when materials arrive until the order is finished) and individual component time. The small financial services company representatives said that their creation of service teams were being measured by numbers of "touches" (contacts or interactions) with clients as well as amount of time spent with specific clients per dollar received.

4.4.1 Responses to the Definition of Marketing Innovation

The Oslo definition of marketing innovation we used in the interviews reads as follows:

> A marketing innovation refers to changes in marketing concepts or strategies to target either present or new markets. For example, changes to a product's packaging, presentation, placement, promotion or pricing.

As with organizational innovation, the discussion of marketing innovation elicited few interpretations of the concept from interviewees though they generally matched some aspect of the Oslo definition. Some definitions included general descriptions, such as "searching for new customers and new business opportunities," "any strategy that can help to promote your business," and "something that increases the rate of customer adoption." Other interviewees presented more specific definitions, saying that marketing innovation means "how to package and how to advertise the product" to get "more business," "re-working of the packaging to present products in a new way," and "[getting] in front of your customers" to foster "brand recognition."

A few interviewees added comments to the effect that they did not necessarily think of their marketing activities, including the examples they provided, as innovative. As one interviewee stated, marketing is "more experimental than innovative. Companies try changes to see if they increase revenue, but that type of change isn't true innovation." This interviewee's only example of marketing innovation was shampoo companies' printing "repeat" on all of their bottles, a simple statement that increased the amount of shampoo people used and increased sales. Conversely, as another company said of the comprehensive redesign of their website and other marketing materials, "It's not innovative to the world but it is to us. A clearer message, that's innovative for us."

Most interviewees agreed with the Oslo definition of marketing innovation. One found the term "marketing concepts" to be vague and suggested "marketing approaches" instead. Another suggested that the Oslo definition is missing the idea of "channel design, how products get to market."

4.4.2 Examples of Marketing Innovation

Most of the examples of marketing innovations provided by interviewees involved promotions, in particular adapting to the internet and other digital media. As mentioned above, one company was in the process of redesigning their website and brochures to provide a clearer and more unified message and target both existing and potential clients. Two separate interviewees said their respective companies have stopped using print for ads and catalogues, and rely instead on their websites and mass emails. Conversely, another interviewee said "we're always looking at the mix of old and new media – print, coupons, TV commercials, Facebook." The interviewee at the company that manufactures electrical generation equipment said their latest approach to marketing is "an email newsletter concept, changing advertising focus to key concepts that resonate with customers and go after our niche better." Similarly, the small publisher said they stopped printing "media kits" (which provide summaries of vital statistics of their titles, e.g., advertising rates, circulation, etc.) and send pdf versions by email to their target audience.

A few other interviewees shared examples related to pricing and other aspects of marketing. The representative of the transportation company reiterated the example he cited earlier in the interview of the flat-pricing model that his company offered at its outset. The metal wholesaler changed their pricing strategy from cost-plus to market-based pricing. Two other companies mentioned their introduction of service "bundling" at reduced prices. Another described their strategy of re-purposing existing products for new markets. The interviewee from a newspaper offered the example of converting a section originally presented as a newspaper insert into a magazine format.

Two interviewees described the desired outcomes or goals of particular marketing efforts, but did not provide particulars about the marketing techniques themselves. One described their taking a "new marketing approach" to realign their customers' perceptions of the company to the reality of the company's activities, but did not elaborate on the specifics of the new approach. Similarly, the representative of a power utility mentioned a campaign to involve customers in reducing their power consumption, but did not describe the marketing methods involved.

One type of company is worth noting, a "business-to-business" company (i.e., one that does business with other companies rather than direct consumers). The representative of one such company said he was not able to provide an example of a marketing innovation introduced by his company, because marketing for them often involves word-of-mouth referrals from "influencers" of their sales channels, e.g., design engineers/consultants, OEM component distributors, etc. Similarly, another interviewee said, "We sell big equipment; there are limited channels for marketing."

Two interviewees provided examples of their companies' marketing innovations that appear to be out-of-scope of the Oslo definition, but seem to match the definition of organizational

innovation. Both interviewees described partnerships or strategic alliances with other companies. One said the purpose of making agreements with partners having similar customer bases is to share logistical resources, namely sales staff and delivery vehicles. The other interviewee said her manufacturing company forms alliances with companies in markets outside their normal markets to facilitate repurposing of their products. The comment cited above that the definition of marketing innovation is missing the aspect of getting products to market, indicates a similar mismatch between the Oslo concept and interviewees' expectations with regard to "marketing."

4.4.3 Records and Metrics Associated with Examples of Marketing Innovation

Several interviewees described metrics that they have used or could use to evaluate the impact of their marketing strategies. A few mentioned their knowledge of the effects on sales, or lack thereof, of new marketing efforts. For example, one interviewee noted that the company compared sales figures when online selling was implemented compared to the same time the previous year, before the online selling was made available. The interviewee whose company was undergoing a redesign of their website and brochures said he had specific details about all costs associated with that effort. Other metrics cited include numbers of marketing emails sent by staff, numbers of customer referrals, and web usage data (e.g., click-throughs). A large company described a metric they use to evaluate marketing and other activities, "customer lifetime value," which calculates the cost of acquiring and keeping a customer, relative to the value of having the customer over a period of time.

5. Records of Expenditures and Sales Related to Innovation

Following discussion of the Oslo concepts, company representatives were asked more generally about any records they may have related to their innovative products and activities and their level of detail. The results largely echo those from earlier parts of the interviews focusing on records and metrics related to the various examples of innovation. Their responses suggest that, in the aggregate, records-based innovation data are incomplete at best. A few companies indicated that formal tracking of innovation-related expenditures is something they are just starting to develop. Only one company, a global chemicals manufacturer, related anything resembling an innovation metric (described in the next paragraph). Many companies, especially larger and/or process-oriented companies, said they track various expenditures related to innovative activities, some in great detail, but they are not called anything resembling "innovation." A few interviewees said that some business units within their companies budget funds for innovation, though they did not provide specifics about how such funds are tracked. The interviewee representing the U.S. subsidiary of a foreign-based global company said that it is a "real struggle point" for him to understand how engineering funds are allocated across the corporate entity, because the relevant decisions and accounting take place at a higher corporate level.

The most commonly reported records were related to product development (reported by six companies). These records were generally described as "quite detailed," and some interviewees specified that they included items like R&D costs, engineering and other employees' labor hours, materials, asset purchases, prototype costs, and costs for an initial production run. The formal innovation metric mentioned above falls into this category, and distinguishes both new products and improved products that exceed revenue thresholds, which vary by business unit.

A few interviewees described costs and other metrics they used to evaluate process improvements. Two of these process improvements were cited above as examples of organizational innovation. In both of these cases, the companies tracked the amounts spent on training staff on the new or improved processes. One company, a manufacturer, also evaluated the effects of the training and of the organizational change in terms of productivity and quality. The other company, a metal distributor, measured additional sales associated with the new sales model and calculated a return on investment. A third company more generally described similar process metrics cited by other companies earlier in their interviews, e.g., time to complete tasks and money saved as a result of process improvements.

The other type of expenditure most frequently mentioned was capital expense (cited by five interviewees) for things such as IT equipment and software, electrical distribution infrastructure, power plant efficiency improvements, and in one case, a "small venture capital fund for disruptive technologies." Most of these interviewees said they track considerable detail related to capital expense.

Only a few interviewees said their records contain project-level information. Four said they track information at this level; only two of those said they collect data in great detail, while a third interviewee said that detailed information is only collected for certain projects, e.g., those related to their lean manufacturing strategy. Only two companies reported internal progress reports related to innovation: One of these companies has internal reports on the progress of projects, and the other said their "total quality action team" (described in section 6.2) provides a monthly report to company leadership. Records on employee training and expertise are generally reported to be nonexistent, the exceptions being 1) an electrical distribution company with a significant operational need for such information, 2) an investment services company (for certain employees as required by SEC) and 3) the manufacturing company that recently conducted workforce skill assessment and gap analysis.

In addition to the queries described above, we also asked interviewees about other specific types of expenditures (listed below). We asked for responses from interviewees at twelve companies, who were asked if each was relevant, and if so, if is tracked. In second round of interviews, additional follow-up questions were asked for five of the categories. All categories were reported to be relevant and tracked to nearly all those who were asked about them, though generally interviewees indicated that they are not able to differentiate between the total expenditures that they do collect and the share used for innovation activities.

i. Additions to software, property, plant or equipment – All 12 interviewees indicated that they have these expenditures and that they track them. One contributed an additional comment that he can break out such expenditures related to the development of new and significantly improved processes. Another commented that identifying expenditures related to new products and processes would involve line-by-line review of the general ledger. A third noted that while they can identify these types of expenditures in detail, it would be difficult to distinguish those associated with innovation.

ii. R&D expenditures (either purchased or developed in-house) – Nine interviewees said they track R&D expense, and the other three said it is not relevant. Two of the nine added that their R&D expenditures include, respectively, their contributions to a research consortium, and only R&D that can be capitalized.

iii. Design activities (in-house and external contracts) – Eleven interviewees indicated that expenditures for design activities are relevant and tracked, though the additional responses of some suggest that "design activities" without additional clarification may capture a wide range of activities from the design of facilities to the redesign of a website and other marketing materials. Two indicated that reporting design expenditures related to innovation would be easier. One company representative said that design expenditures were not relevant to her company.

iv. Acquisition of IP rights and licenses – Seven of the twelve companies indicated that IP rights and license acquisitions are relevant and tracked, and the rest said they are not applicable. One of the seven for whom the question was relevant specified that this included goodwill analysis of trademarks, but not IP in-licensing. Another said such acquisitions only included the occasional end-user license agreement.

v. Employee training – Ten interviewees stated that they capture training-related expenditures, but several added that their records contain only a single account, and breaking it apart would be difficult. Another interviewee said the company has training expenditures but that they are not tracked.

vi. Advertising, marketing campaigns, market research – Eleven companies indicated these expenditures exist and are tracked. One manufacturing representative said they could likely associate these costs with new products, as they launch new promotions for new products and compare the results with sales of existing products. A contract manufacturer said they track advertising campaigns relative to existing and new markets and customers. Another manufacturer said they track "hard" advertising costs but not employee labor hours related to them. The interviewees from a newspaper said they track employees' time and travel costs related to marketing, as well as in-kind exchanges with other companies.

vii. Collaborations, alliances, joint ventures, acquisitions of other enterprises or divestures – Ten interviewees indicated such expenditures are tracked, and the other two said they are not relevant. Two companies clarified that they have joint ventures, and one of them said that

acquisitions and divestitures are "always ongoing." The newspaper representative, reacting to "collaborations," reiterated the in-kind exchanges reported above.

viii. Intellectual property protection measures such as patent or trademark applications – These expenditures were reported as relevant by eight companies. Two interviewees specified that their companies have trademarks and patents, respectively. One company representative noted that such expenditures are only tracked at the subsidiary level.

6. Summary

This section summarizes the results presented in the preceding sections with regard to variation and consistency among responses.

6.1 Descriptions of Innovation

All but one interviewee readily offered a definition of innovation. While the definitions offered by interviewees contained many common descriptors, they also contained many variations and divergent components. Several interview participants provided qualifiers generally indicating that innovation implies something new, unique, or significantly different.

Most interview participants generally indicated that "innovation" is not the same as "improvement", and offered several characteristics and contrasting examples to distinguish the two. One of the distinguishing characteristics of an innovation is that it is new or unique: "Innovation means to be unique, to create something; while improvement means the addition of a new feature." Another said, "Innovation is a different way to do things… Improvement is making the same process better." Others qualified an innovation as being a "radically different" method for producing the same product.

Although many of the interview participants described innovation as key to the continued viability of their companies, few said they spend much time thinking about "innovation" per se. A few interviewees at some of the larger companies said it is something they are starting to think about innovation in a formalized way, and mentioned business innovation theorists such as Clay Christensen.

Few companies maintained formal innovation metrics. Only one company had any internal metrics related to innovation. This company is a global chemicals manufacturer, and the innovation metric identifies new and improved products that exceed significant sales thresholds, which vary by line of business. Other companies said they do not track sales or expenditures in relation to innovation. It should be noted that a few interviewees described organizational changes and management processes intended to foster innovative thinking and the sharing of ideas internally, and evaluate the potential benefits and risks of new proposals for implementation. The latter interviewees tended to see such examples as they cited as being innovative.

Examples of records-based metrics—that may or may not be explicitly associated with innovation—that interviewees provided include:

- On-time-delivery rates
- Sales by product line/SKU
- Sales per employee
- Scrap resulting from production
- Workforce surveys

Although examples of advanced technology were often cited in relation to innovation, most interviewees said that technology is not integral to innovation, but may be merely instrumental. Many examples were also given of innovations that were acquired from outside the companies, and most interviewees affirmed that innovation does not have to originate within their own companies.

Most of the examples of innovation provided by interviewees prior to the introduction of the Oslo definitions generally focused on products and processes, with far fewer related to marketing and none related to company organization.

Several interview participants were able to provide examples of innovations they considered unsuccessful. These generally fell into four categories:

1. Failing to understand adequately the intended customers or markets
2. The eclipse of a product by a competitor's superior product, or the earlier arrival to market of a similar product by a competitor
3. Problems with distribution
4. Purchased software that did not perform as expected

Many companies said an innovation needed to successfully commercialized in order to be considered an innovation. Three companies said they had innovations that were initially not successful, but were not considered failures because they contributed knowledge that could be successfully applied later.

6.2 Reactions to Oslo Definitions

Overall, interview participants agreed with the Oslo definitions and appeared to interpret them correctly, with a few exceptions. As noted above, nearly all the examples of innovation provided prior to the introduction of the Oslo definitions corresponded to some aspect of the Oslo definitions, and these examples were generally reiterated by interviewees in response to the corresponding definitions.

Product Innovation

A few interviewees had difficulty applying "product innovation" to services, and when additional examples of product innovations were elicited in response to the Oslo definition of product

innovation, they tended to be service-related. These observations suggest that some respondents may tend to think of "products" as goods, and may need extra assistance in applying the definition of product innovation to services.

Similar to the pre-Oslo discussion, "significantly improved" in the definitions of product and process innovation appeared to be ambiguous to several interviewees. Some of them said that because of this term the definitions lack precise criteria for identifying innovative improvements.

Process Innovation

Exposure to the Oslo definition of process innovation elicited mostly examples that corresponded to the definition.

Organizational Innovation

In contrast to reactions to the definitions of process and product innovation, there appeared to be greater variation in interpretations of the Oslo definition of organizational innovation, and somewhat greater variance from the intended meaning. For example, two interviewees interpreted organizational innovation in terms of an improved business model. Another said that organizational innovation has effects across the organization, and cited as an example the revolution in intra-company communications brought about by the introduction of e-mail. A few interviewees also said they did not think of organizational changes as innovative.

Examples elicited in response to the Oslo definition of organizational innovation generally appeared to be within the scope of the definition, and were related to the organization or management of business operations, the management of innovation-related activities, training or mentoring, and a focus on specific market segments. Suspected out-of-scope examples include the above-mentioned example of changing health insurance providers to provide expanded options for employees, buying new energy-efficient equipment, and using Google Mail and Google Docs instead of printing documents for the purpose of sharing and working on them.

Marketing Innovation

The Oslo definition of marketing innovation had a similar reception to that of the definition of organizational innovation. Some interviewees described their marketing activities as not necessarily innovative, but rather more "traditional" marketing methods. As one participant said of the strategy guiding the redesign of his company's website and print marketing materials for consistent look and messages, "It's not innovative to the world but it is to us. A clearer message, that's innovative for us."

Many of the examples elicited by the Oslo definition involved electronic media – Internet, email, etc. – and a switch from or reduction in print advertising in favor of electronic means. A few examples were related to pricing strategies. Some interviewees' companies occupy niche

markets in which broad marketing approaches are eschewed in favor of attempts to reach influential actors in their industries and obtaining word-of-mouth referrals from such individuals and firms. Two suspected out-of-scope examples both involve strategic partnerships with other companies and appear to be related to organizational innovation. Another interviewee said the definition is lacking a reference to methods for getting products to markets, which is more related to process, and which suggests an interpretation different from the intended meaning.

6.3 Records Related to Innovation Expenditures

Records-based innovation revenue and expenditure data are incomplete at best. Manufacturers tend to be able to track costs related to new products – materials, labor hours, R&D, etc. Most companies indicated that they track project-level expenses, though they are not labeled "innovation." Large and/or process-oriented companies (manufacturing, information services, energy) track detailed information to facilitate process improvement, though the metrics that some interviewees reported tend to be specific to their type of operations and processes. Capital expenditures and other significant investments are generally tracked in detail, as are R&D costs for companies that have them. Information on employees' certifications and skills is generally not tracked, the exceptions being an electrical utility, an investment services company (for certain employees as required by SEC) and a manufacturing company that conducted workforce gap analysis.