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ORAL HISTORY—

MORRIS HANSEN

This is an interview conducted on June 22, 1983, with former Associate Director for Research and Development, Morris Hansen. The interviewer was James L. O'Brien, former Assistant Division Chief for Mathematics and Statistical Data Analysis, Statistical Research Division.

O'Brien: Morris, could you tell us something of your background, your education, your special areas that you studied, and something of any previous employment you might have had before you came to the Bureau.

Hansen: Yes, I graduated from the University of Wyoming in accounting in 1934. By then I had decided I had a professor who was an exceedingly good teacher in statistics—not necessarily and honestly learned in statistics—but an exceedingly good teacher. He interested me in statistics, and I decided I wanted that to be my career. So I took my first job in accounting when jobs were scarce in the depression. I worked for 3 months. A professor of mine came to the Census Bureau. He knew the Director of Personnel and suggested that he get me to come to work at the Census Bureau, which he did. I had been high on the Civil Service list long before, but I did not receive anything. In 1935, I came and worked in the Census Bureau's Personnel Division for a year with the intention of both of us that I would move into statistics; after a year, I shifted over to work with Calvert Dedrick [in 1946, the appointment of Calvert L. Dedrick as Coordinator of International Statistics marked the Bureau's first effort to establish liaison with foreign statisticians] in the Statistical Research Division. At the same time, I started taking courses at American University and the Graduate School of the Department of Agriculture in mathematics and statistics. I had probably taken more courses in statistics than very many people, but they were all overlapping and not on the whole that comprehensive; but, I got some background in statistics that was very helpful and we learned a lot on the job.

O'Brien: Did you find that the statistics that were being offered in universities in the 1930s had much direct applicability to the problems that you faced—the statistical problems you faced at Census?

Hansen: Not really, because they were economic statistics courses, and most of them were analytical, but they interested me. The guy who taught statistics there also taught mathematics because none of us had much mathematics. So I learned some mathematics. I never had calculus before I came to the Bureau. You do not find many accounting students who had, and he taught us a little calculus. I took some after I got here.

O'Brien: So, some courses were applicable, and others really just sort of conditioned you to develop the statistics.

Hansen: Yes; most of the courses were applicable, but some of the courses only conditioned a person to develop the statistics.

O'Brien: Maybe that is the most important thing of all.

Hansen: I still regard this guy as the one that influenced my life the most.

O'Brien: What's his name?

Hansen: Forrest Hall.

O'Brien: You were remarking earlier about your experience in Personnel Division. Many people are somewhat surprised to learn that Morris Hansen actually spent a year and lasted a year in Personnel Division. You indicated that you found it very helpful in terms of learning about the organization.

Hansen: Yes, because it put me to work in all parts of the Bureau. I had to learn it—had to learn what was happening, and I found it useful. I would not have wanted to stay in it any longer. It was not a bad year of getting acquainted around the Bureau. I was not sitting in an office, you know, doing clerical work. I was out talking with people about what they were doing. It got to be an education.

O'Brien: In terms of the major projects or problems faced, you went over several of them this morning in the staff seminar, and I thought you did particularly good in covering applications and sampling and a number of Bureau problems. You indicated, however, that there were some areas which are not generally appreciated, especially those which deal with interaction between sampling and geography. I wonder if you could tell us something about that.

Hansen: Well, the Master Sample Project is illustrative and particularly important in this respect as far as the interaction between sampling and geography is concerned. The

Department of Agriculture had started to develop a program in cooperation with the Laboratory at Ames, Iowa with Arnold King and Ray Jessen. The Census Bureau was considering using sampling in the Census of Agriculture to supplement that census and, at the same time, use a subsample of that to evaluate the Census of Agriculture. Along the way, it seemed like the mutual interest of these two projects was pretty substantial, and the Census Bureau agreed that it would join in sponsoring the Master Sample Project. The agency developed a project to draw a large sample to support the Census of Agriculture. I have forgotten what it was, but it was on the order of a 5- or 6-percent sample of segments. I believe there were 300,000 segments with an average of five farms per segment. The Census Bureau's Geography Division had already been doing a little work with aerial photos and with the maps that were used from the Geodetic Survey. The laboratory used these public roads maps, I think, and arranged to have additional information put on them. The Bureau was enthused about area sampling and saw this as a way to get a sample for the Census of Agriculture. So, Census and the U.S. Department of Agriculture went to work on that. Census put up a fair amount of the funding to undertake the work jointly with the U.S. Department of Agriculture to develop this large area sample. The project was to create sort of a frame from which samples could be drawn for all counties. In the process, we used aerial photos to designate those samples; the photos were very powerful devices for communicating exactly what was a segment. They were not available for the whole country, but they were for a great part of the important agricultural areas and populated rural areas. In the process of doing that, we came to find that we needed to delineate built up areas from those that were not and treat them differently in sampling. This resulted in identifying, for example, unincorporated places and unincorporated small towns (which were found to be useful). We proposed modifying the system of identifying geographic areas for the census. Out of that, the Bureau's Geography Division's employees and the individuals working in sampling decided it was feasible to define urbanized areas using aerial photos. These Bureau employees worked as a team on this project with the people at the laboratory in Ames, Iowa. Census ended up with a sophisticated set of maps that identified urban and rural places in the United States as they had never been delineated before. In the past, boundaries had always been established, with some special exceptions, just for incorporated places. If a location was not incorporated, it was considered rural, like a lot of suburban areas around Bethesda, Maryland. Some of those areas (and there were only a few) were specified as being urban by special rule or special exception; mostly those kinds of areas

were treated as consisting of rural populations and not identified in a way to indicate their respective characters. The new program modified the whole approach to the classification of geographic areas for taking and presenting the census results. Beginning with the 1950 Censuses of Population and Housing, the Census Bureau identified such areas using those kinds of resources. There were other kinds of geographic developments that grew out of standard classification. The agency began to ask questions like: Why are these different? The first answer was they are because of general purpose programs. The Bureau looked into its programs and found they were really different because they started with different map resources. Again, for sampling and other purposes, it was helpful to get some standard classifications. The Census Bureau worked with the Bureau of the Budget (later to be renamed the Office of Management and Budget) in setting up standard metropolitan statistical areas.

O'Brien: **I am curious as to whether or not the Census Bureau ever made area crop measurements in any of its agriculture censuses or was that left pretty much to the U.S. Department of Agriculture?**

Hansen: It was pretty much left to that department. There was a lot of discussion in those early years of using a sample from the agriculture census annually and conducting a full census of agriculture every 10 years. The Census Bureau uses some of the sample in the Current Population Survey and the rural area sampling. However, using the sample to conduct an annual “survey of agriculture” never did come to pass. There was, however, always a degree of cooperation between the Census Bureau and the U.S. Department of Agriculture on who would do that.

O'Brien: **A topic that you made some mention of this morning but did not give it the attention I think it deserves is the work done on the response errors. It would be interesting if you could indicate how you first developed an awareness of the importance of response errors and maybe some of the thinking that went into the development of the response error model and, as you indicated, is still pretty much the basis for the work that is being done in the area of response errors.**

Hansen: With respect to response errors, I think there are two “settings.” One is the “census way”; everything is running fine and there are no problems. This was the general attitude with respect to the census, although everybody had to know better; but, a lot of the attitude was to act as though that was true. I expressed that point this morning but in a different way. The Bureau collected the statistics in the field, and it was assumed that the data were correct; but, there were no efforts to find out if

the information was correct or not. The process was to make sure you did not make any errors during the data-processing operation. That was sort of the philosophy, but along with that and right in parallel with it were all sorts of indicators of response errors. Anyone could look at the information at the time and correct the mistakes long before “we got here.”

O'Brien: **Was Gladys Palmer [of the University of Pennsylvania in the 1940s and 1950s] working on this?**

Hansen: Yes, but she worked on this issue long before “we got here”; but, I started to say something else that was done long before that. Gladys was here in the early days when the Bureau was working on the sampling. It was not hard to look at the census and see that the number of survivors of people listed as born in the United States at age 10; this number of children in that age category was more than could have survived from the number of children covered in the census 10 years earlier. You can look at sex ratios in the census by 5-year age groups, and you start off with sex ratios as they should be in relation to birth statistics; that is, whether it is 106 males per 100 females or something like that. Then you move along to higher ages and pretty soon there are more males again. Then it switches over again, later. There are twists in there that did not make any sense in relation to what was there 10 years earlier. You did not have to look long at these kinds of things to see that there were errors. This was done by analysts who were aware of the errors. The Census Bureau was not the originator of these kinds of questions, but the agency began to ask questions about how it could measure such things as response errors. There are two types of approaches—one is to conduct analytical comparisons of information from different sources which are contradictory; the other approach is to conduct an internal analysis, as I just described, and begin to reenumerate and compare results. Gladys Palmer was one of the early persons who did that. People were well aware when Census started talking about these things, raising questions, and examining them that the errors were caused by people who were paid on a piece-rate basis without effective supervision. I remember when the Bureau started talking about the 1940 census in terms of providing effective supervision of enumerators. There were instructions which said that supervisors were to review the work of their respective enumerators after they completed their first day’s work. The supervisors had some number of enumerators, I cannot remember the number; but, if they did that the census would be standing out there waiting 30, 40, or 50 days for them to review the numbers. Those instructions did not get carried out that way,

but I mean that was a carryover from a previous census. There were all sorts of things pointing to lack of control in the field as potential problems that we did not know much about, but we wanted to examine and understand them.

O'Brien: **You are saying it reflected a kind of prevailing ethic that people really did these things, but when you counted you had an accurate count.**

Hansen: It seemed like a simple job. Anybody knows how to count. We were not the first to raise these kinds of questions, I'm sure; but, the Census Bureau was among the early ones to really push on it. Gladys Palmer had done this earlier work and stimulated a lot of reaction because it showed gross differences between the original numbers and the figures obtained in a reinterview enumeration and the net differences. I am sure there were some other studies, but Gladys' work was one of the highlights. She did something like Current Population Survey interviewing on a special basis. Anyhow, these stimulated questions when the Bureau started doing experimental work, which dealt with other questions on questionnaire design, and other aspects of data-collection methods in preparation for the 1950 Censuses of Population and Housing. During and after the 1950 Censuses of Population and Housing, the major work in this area took place. The Census Bureau set up a response model in thinking about these problems which was used in planning the 1950 program; the first paper that was published on the topic, I guess, was by Marks and Mauldin [Eli S. Marks and W. Parker Mauldin worked on response research under Morris Hansen and William Hurwitz in the 1940s and 1950s in the Bureau's Statistical Research Section], Hurwitz [William N. Hurwitz was the Chief of the Statistical Research Section] and Hansen. Another paper gets cited more frequently because it is a better paper, which was published about 10 years later, by Hurwitz, Bershad [Max A. Bershad, a staff member in the Bureau's Statistical Research Section took the lead in probability sampling of retail stores for the 1948 Sample Survey of Retail Stores] and myself. We were giving a lot of thought to it then, and how to set up experiments. That led to the development of this kind of model and approach. That guided us in setting up experiments to be conducted during the census in which we randomized the work of about 900 to 1,000 enumerators. We tried to simulate the real conditions of interviewing by other enumerators, except we cut their enumeration district sizes down a little smaller with this randomization so that an enumerator could do two enumeration districts in a normal time period; that analysis did a lot to open our eyes. This work was done by analysis the Bureau got after, and not before, the 1950 census was conducted. At the

same time, as the Bureau started to probe these problems, the agency asked: “How can you measure these things?” At that time, the Bureau thought it could set up tests for checking the completeness of the census, for post-enumeration surveys for checking the completeness of the census, and for checking the quality of the information. The agency thought it could cure what were the obvious weaknesses of the census process by putting people “out there” who were paid adequately, were supervised carefully, who had a great deal more training, and knew what they were doing. The agency picked interviewers from a census who had performed well, had a good reputation, and needed this extra work. They were assigned to perform the post-enumeration surveys to check coverage completeness of the census. I guess it came as something of a shock to us that better coverage was not achieved. Census seems to get better on developing content issues; with respect to coverage completeness, however, we did not do significantly better. The gross errors in content showed that there is a lot of truth that is not known, and the Bureau does not get truth by asking the questions a second time. On coverage completeness, the agency ended up identifying two classes of errors—those caused by missing housing units and those caused by missing people. It is called within housing unit, but you cannot say for sure whether it is within housing units or because they are not associated with housing units. At a minimum, people are missed because even though the agency has the correct housing unit the individuals were not enumerated. The post-enumeration survey on coverage was made somewhat effective by a matching approach when the Bureau matched the survey against the census. I do not think the Bureau’s post-enumeration survey net coverage was any larger than the census itself. If Census matched the survey to the census, however, it could identify those individuals missed in the census and analyze their characteristics. It was disappointing that the agency got relatively little payoff, although the Bureau did identify missed housing units as an important miss. Census was not really able to identify others. People looked at explanations of why infants were missed around the 1940s; the answer was people thought a baby in the family was not yet considered a person for the purpose of determining the number of people living in the country. Some of the agency’s later work shows that was not what caused these kids to be missed at all. Parents also were missed. When the coverage check was done, some “highlights” were obtained; but, the agency did not get everything.

O'Brien: That is the first time I knew that. I had always heard that conventional wisdom that you mentioned earlier that they had not yet qualified as members of the human race.

Hansen: Of course, there is no one unique answer that is right all the time; by and large, however, what the Census Bureau learned is that these families are in motion. They are young families that move a great deal, and we tended to miss them. My statement of why the agency missed them is a speculation. The Bureau did a registration check. There is always a question about how complete the birth and death records are. Census established a birth registration check in connection with the 1940 census in which the agency cooperated with the people now in the National Center for Health Statistics. So, Census took a sample of births and went out to find newborn babies and their parents in the census. During the operation, the Bureau found that many of the newborn babies had birth records but the agency had missed their parents in the census.

O'Brien: That is a very interesting point.

Hansen: As a result of that finding, the Census Bureau determined that it had a significant problem on its hands, and that the problem deserved a great deal of attention to solve. I guess to this day, except by using independent matching studies, the Bureau has not really found ways to directly enumerate the population and get a complete count. The evidence points to the fact that interviewers substantially contribute to coverage errors. In particular, small areas were subject to large enumerator variance; as a result, the agency brought that into the redesign aspects of the work. Well, those were very interesting days trying to understand how to measure and evaluate. The Bureau learned that housing units are missed, and it thinks it can cover them. I think it was Max Bershadt who came up with the suggestion of a housing check. I think it grew out of a post office check where the post office got these voluntary registrations in and cased them, sorted them by postal routes, and checked them against the housing units. I think it turned out to be an effective procedure for improving a lot of the under coverage of housing units. I do not know how serious it was in the last census, but I am sure that census got rid of a fair part of that under coverage, at least in the areas where the post office knows the areas.

There are a couple other aspects of response errors to talk about. One of them is the work that was done by Waksberg and Netter [Joseph Waksberg and John Netter worked in the Census Bureau's Statistical Sampling Section as statisticians] for measuring expenditures for housing maintenance and repairs on "bounded"

interviews, with a set of experiments on bounded interviews. Before you ask someone to recall something, you do an interview about those expenditures for a prior period; then you “bound” this with the last reported expenditures. I thought it was a rather sensational set of results that were arrived at, and the information influenced the Bureau’s thinking in many ways. So, Census started to set up a project on the Current Population Survey because it contained gross errors, particularly with respect to the unemployment figures. There are some things I still do not fully understand about it, and again my numbers will not be right. However, my recollection is that, in orders of magnitude such as this on unemployment, if you do a reinterview you are going to do a dependent reinterview. This kind of reinterview makes the gross errors more harsh.

Anyhow, those gross-error levels were far larger than the agency felt desirable, and it thought it could get this “bounded” interview and some other things into our Current Population Survey’s research program. The Bureau thought it could learn how to do interviews better. Census conducted some experiments and found that the “bounded” interview approach (which the agency was using with great success for expenditures) was producing little or no benefit when it came to the Current Population Survey unemployment information. The Bureau thought that perhaps the “bounded” interview method would cure some of the gross errors when respondents checked particular boxes. When the interview was complete, the Bureau would say something like: “Your employment status was such and such last time. Does the information you now reported represent a change or did the agency make a mistake the previous time it asked for the data?” However, Census did not ask the question in such a way that made it seem that what the respondent just told you was misrepresented. Well, that was one kind of approach. Another was to start the interview by saying: “Now last month you [the respondent] reported a particular employment status; what is your present status?” It did not look like the agency was getting its fingers on the core problem using the above method. Whenever you go back and reconcile a third time, the agency would always get the respondent defending his/her most recent answer and not ever getting any helpful results. I say that without having done enough analysis on it because some other things came along and the project got stopped before it was completed. More recent studies have been conducted since that time. While there is evidence that there are gross differences in response errors, net differences are not tremendous. However, they are not trivial with respect to the Current Population Survey’s unemployment data.

O'Brien: Was John Netter working at the Bureau as a regular employee then?

Hansen: I do not think he ever worked as a regular employee. He came in on a sabbatical; a number of people came to work at Census on that basis. John worked for me one year, and then he and Joe Waksberg communicated on a lot of things thereafter.

O'Brien: On the subject of the book—the “bible”—you and Bill, the two Bills (Hurwitz and Madow [William G. Madow, statistician at the Bureau]) had a very special opportunity to put out a book that was really not quite ahead of its time, but it was the leading edge of a subject; certainly it changed the lives of a lot of people. (*Sample Survey Methods and Theory*, 1953.) Reading that book was what made me decide to come to work for the Census Bureau.

Hansen: I am glad to hear that.

O'Brien: As a matter of fact, I wanted to become a statistician. It is the first chapter of volume I that struck me as being so sensible and so promising that I figured it must have affected a lot of other people.

Hansen: George Hall [George E. Hall worked in the Statistical Policy Division of the Office of Management and Budget] told me the same thing. Did he ever tell you that?

O'Brien: No.

Hansen: That this was the reason he came.

O'Brien: That is an independent observation.

Hansen: Of course, that work was a work of love, and we worked hard on it nights and weekends for about 8 years. The Bureau gave us all the help they could legally. It certainly had two effects. The first one was when you start writing a book, you find that you do not know the answers to things that you thought you did. Many problems were solved in connection with writing the book that we sort of thought we understood, but we did not until we began writing the book. So, we learned a great deal writing the book. Although it was hard work, writing the book was a tremendous and fascinating experience over those years. Certainly, it was a report on the work that was done in the Bureau by all of us—Bill and I and many others—and I am sure credit could not be given to all of them. However, credit was given to quite a few of them. Well, that is the creation of the book. After it was published, it certainly had a substantial impact on us and our relations to the world; we became known around the world, which we somewhat had been before, but nothing like that. From a few articles that had been published, and from people who had come

to the Bureau and worked with us and also were in demand around the world, I have a feeling that there are some other things like it. I guess the way you are supposed to do things, the right way to do them, is to look up the literature and find what has been written, and then you start from there. When we were working on sampling, we looked at a problem; we usually found it easier to solve that problem directly than try to find what is in the literature.

O'Brien: **That is interesting. I think that tradition still persists even in areas where I am not sure it is most effective.**

Hansen: I am not sure it is always the most effective. I think sometimes it is effective and you learn new things. I am not saying that is the right way or the wrong way, but usually before we got too acquainted with the literature, we looked for a short-run solution. I guess we learned by that, too. What I started to say is, the book was written from the point of view of solving sampling problems. The book is not a catalog of sampling methods that you can look up and find the solution to your particular problem. The book focused the discussion on the problem, but the book was not written as a mathematical exercise. A mathematical exercise appears in volume II, and I think that it has proved particularly interesting to a lot of people for that reason. I am amazed that that book, which was published in 1953, and this is 30 years later, has been selling well until the last few years; it is still selling some.

O'Brien: **I think that is a high tribute.**

Hansen: I was talking with someone recently who used it in teaching, and others who are still using it in teaching because it has this perspective which a lot of other books do not. Obviously, it is out of date for a lot of topics, but the key topics of sampling still are there, at least most of them.

O'Brien: **Have you ever taught a course based on the book?**

Hansen: Yes, but not very much—mostly based on the outline of the book while we were writing it. Bill, I, and Joe Steinberg taught a course at the graduate school at the U.S. Department of Agriculture for several years. I really should say that Bill and Joe Steinberg [Joseph Steinberg, Chief, Statistical Sampling Section at the Bureau] did most of the teaching, but I did it for 1 or 2 years.

O'Brien: **Well, I would have guessed that the book would have put you on the international circuit to some degree.**

Hansen: I am sure it did enormously.

O'Brien: I was going to ask whether you had any evidence that it had affected the statistical practices of other countries.

Hansen: Evidence is a little hard to find. Definitely, it is my impression that it has been widely used and had a big impact. People talk about it again and again. When you refer to it, it seems to be kind of a standard reference. That is the “bible” around the world. My impression has been that it has been widely used, certainly for teaching and more so for practitioners. I assume, however, that now it has been replaced.

O'Brien: When I took my statistics courses after coming to the Bureau, they did not use that book at George Washington University at that time, but I really found that it was quite accessible in the sense that you could pick it up and start reading it and work your way through the problems; I would expect that it might be especially popular with practitioners.

Hansen: Well, that is what I am trying to say. I think that Cochran’s book and some others are the standard for textbooks.

O'Brien: They are cleaner in the sense that they do not deal with messy and complicated problems that are characteristics of real life problems. As a matter of fact, there was a personal question that I had. I could not help observing in your curriculum vitae that in 1953, I believe, you were President of the Institute of Mathematical Statistics. Was this related to the fact that the book came out in 1953 or had you been elected to that position before the book?

Hansen: Well, I had been elected to the position as Vice President, and I have a feeling that the book was not the factor. We and the Census Bureau were beginning to get a lot of local recognition. It was kind of a shock to me, too, incidentally.

O'Brien: In what respect?

Hansen: I mean being elected President of the Institute of Mathematical Statistics. I did not know any mathematics.

O'Brien: You might be the only accountant that has ever been President of it. It seems that in recent years it has become more and more specialized and highly “mathematized.”

Hansen: Well, when I was elected, the number or proportions of articles I could read in the annals was a very small fraction. You know, read with facility.

O'Brien: **With full understanding?**

Hansen: Lots of them I had no hope for, and it has become worse. That is partly because I was never a mathematician. I worked using simple mathematics from the intuitive side and always worked on a team with someone who could fill in the mathematics, and that was an effective way to work.

O'Brien: **Nothing succeeds like success. You cannot knock it.**

Hansen: But, I think the election to the Institute of Mathematical Statistics was just recognition of the work we had done here at the Bureau. I was elected in 1953, and the book did not come out until near the end of that year. So, it could not have been the book.

O'Brien: **I think that your account of the personal building process that occurs when you write a book brings out the Francis Bacon, “reading maketh a full man, speech a ready one, and writing an exact one.” It forces you to be exact when you go on record.**

Hansen: The book was pretty well received as something that deals with the issues in a fairly accurate and careful ways.

O'Brien: **Let us move along to electronics. From at least one reference I read that in 1944 you met with J.P. Eckert and J.W. Mauchly [Eckert-Mauchly Computer Corporation that the Bureau contracted in 1948 for the first UNIVAC system], who were part of the UNIVAC development.**

Hansen: I think there is a little doubt about whether it was before, during, or at the end of the war. I was just reading, incidentally—

O'Brien: ***Revolution in U.S. Government Statistics?***

Hansen: Yes, I read some of it before I came over to remind myself of a lot of things instead of digging out papers. I decided two things. One, they have done a pretty good job.

O'Brien: **I found it pretty interesting, and they seem to have checked it with most of the participants.**

Hansen: The people involved are more carefully checked than most. Well, I just mentioned this, because as I remember, there is a little doubt about that date. It was either just before the war was over or after it was over. It was probably 1945 I think—not 1944, but it might have been as early as 1944. There was a great deal of discussion of what that UNIVAC ought to look like. However, because the Census Bureau had

been the place for punch card equipment and its major application and growth in the early years, UNIVAC would be useful to the agency. It was well known that Hollerith [Herman Hollerith, 1860-1929, designed the punchcard and electric tabulating machine] did his work for the Census Bureau, and it had a laboratory in which we improved the equipment and were a major applier of it. So, we believed that it would be useful to place the UNIVAC at the Bureau of the Census. The Bureau's only question was could the Eckert-Mauchly Corporation deliver. The agency was totally interested in this kind of thing anyhow. I had been personally pushing the Bureau to develop a multi-column sorter, and the people in the Bureau's machine lab said you could not do it that way. I had studied enough of the process that I could have designed a multi-column sorter. I could not have made the electronics exactly right, but I could put down the logic of the multi-column sorter.

O'Brien: **In your discussions with Eckert and Mauchly, had they developed the notion of the flexible programming?**

Hansen: They were basically thinking about a computer that came out to be the UNIVAC.

O'Brien: **The basic architectural design of the UNIVAC was reasonably set in their minds?**

Hansen: Yes, tape input and output, buffered input and output, internally program controlled.

O'Brien: **I did not realize that their thinking had developed that far.**

Hansen: Yes, they really thought it through. The first tapes were steel tapes, as you probably know, and they planned to work with steel tapes because they felt they would be less troublesome. The logic was laid out well in their minds. Indeed, I remember well, as many others do, the fact that they referred back to Babbage [Charles Babbage, 1791-1871 England, who was the inventor of the first automatic computer]. Babbage had everything we had conceptually, and they were following his logic, except that Babbage was working with mechanical instead of electronic principles, and the mechanical principles and his machine would not work. The mechanical principles for each of the pieces would work, but it was an integrating machine, and apparently he did not get a total system that was effective. Developing and integrating pieces and making it work were things to be done. I do not remember what kind of memory the Eckert-Mauchly Corporation talked about when it talked to us the first time, but I imagine it was the kind of memory the corporation ended up with in the UNIVAC. Are you aware of the memory of the UNIVAC?

O'Brien: **Not specifically. The UNIVAC was before I came here.**

Hansen: Well, it was a mercury tank memory. If you ask me to describe it accurately and carefully, they would laugh at how I describe it. Nevertheless, it was basically an electronic impulse with input to a tube of mercury. The impulse traveled through the tube of mercury at the speed of sound and came out at the other end, and was restructured and put back through and just recirculated; one could tap it off and change it when you wanted to.

O'Brien: **I have heard it described in that way.**

Hansen: It is essentially like a drum memory, but it is a mercury tank memory, and I guess faster than drum memory would be. However, I am not sure about that. It was a way of getting away from a lot of vacuum tubes, and it worked beautifully. That is just one way of accomplishing the logic of a memory in the system. There were other ways. Vacuum tubes would have done it, except that there would be more maintenance requirements and more expensive.

O'Brien: **Reliability, I suspect, would have been a very serious problem.**

Hansen: By the time an intermediate machine or two had been built that had essentially the major principles of this operating, the Bureau of Standards had developed the Standard Eastern Automatic Computer [also called by some the Standard Electronic Automatic Computer]. I do not know what kind of memory this computer had. Anyhow, the UNIVAC changes were taking place so fast, by the time we were making the decision to let the Eckert-Mauchly Corporation build the UNIVAC, the corporation had come through with the final plans and arrangements, which were totally obsolete. Electro-static tubes were now the way computers were going to be built for memory, and the International Business Machines Corporation was "releasing" one. We and Eckert and Mauchly stimulated the International Business Machines Corporation to move much faster. It was going to move slowly, and I do not know when it would have gotten there.

O'Brien: **You have mentioned elsewhere that the International Business Machines Corporation gave up on producing it for the 1950 Censuses of Population and Housing. That was very interesting. They got into the game late.**

Hansen: Therefore, the Bureau decided to go ahead, and the agency never would have had a machine if it had not said it was going to build an obsolete one. Nothing, I think, was ever a more right decision than that one was. I do not think we would have a computer yet.

O'Brien: **Was there anyone else who was, in effect, crowding the Census Bureau to buy a computer?**

Hansen: Well, Census contracted for the first computer but then there was a period when the contract status was in some doubt. When I said the Bureau contracted, it did not do it directly. The Census Bureau transferred funds to the Bureau of Standards and it arranged the contract. There was a period there when the contract for building the computer was open. A.C. Nielson, who communicated with Census a great deal, made a bid for a contract and got one. Then it backed off, and the Bureau ended up actually contracting again for the first computer.

O'Brien: **We were the only ones?**

Hansen: Well, no one was racing us for it. The Air Force and the Army Map Service was very interested. When it came to contracting for the actual construction, three of them were contracted simultaneously. Number one for Census, number two for one of those two, I do not remember which, and number 3 for the Army Map Service.

O'Brien: **Cooperative. People have remarked that there was not, at that time, such a thing as an electronic data processing department in any organization. However, the Census Bureau had a hardware department with punch machines. Was there any feeling internally that it would be more appropriate for the punch card part of the Bureau to take over this procurement, this design, or the application of the computer? Or would they have been over their heads?**

Hansen: The hardware department was participating in this effort. There was really no serious question during the development stage that it should not be in the research and development function. As soon as the Bureau accepted it, however, I think that the Machine Tabulation Division handled it. Running that kind of administrative operation did not belong in research and development. Then the Census Bureau learned that there was still more developmental work than the agency realized. There was a period where the work was transferred back to the research group to operate because there were many things to learn about the operation that were not just ordinary management issues. Whether that was a good decision or not I do not know, but it probably was. The research group was involved for about 1 year and then the work went back to the Machine Tabulation Division, as it should have.

O'Brien: **Did the research group provide many of the early programmers?**

Hansen: Joe Daly [Joseph Daly, Assistant Chief, Statistical Research Section] was just a pillar of strength. Jim McPherson [James L. McPherson, Machine Development Staff

of the Statistical Research Section] turned to Joe for help, and I turned to Joe for help. Then, as we started using it, Eli Marks and others started developing more of a system. Of course, a lot was going on elsewhere too, with Eckert and Mauchly and others. By the time the Bureau got the computer delivered, there were machines coming out of the International Business Machines Corporation—maybe even before the agency got the computer delivered, but I do not remember the sequences. It took the International Business Machines Corporation two or three rounds before they produced a computer that was as good as the UNIVAC for data processing. For example, they produced a 705 computer, but initially it did not have a buffer on it. I remember that the computer was sitting there waiting for punch card information to come in. I should mention the names of many more people than those already noted. The methods group were involved in this. Employees working in the subject-matter divisions were getting involved, like Bob Pearl [Robert G. Pearl, Chief, Economic Statistics Section] and others, and people in the tab division. Without Joe Daly's help, I do not know what would have happened. Subject-matter staff were brought in. The Bureau had a philosophy that if programming was going to be successful, programming needed to be associated with subject-matter staff, and that it should not be a centralized operation. When the work was completed, the Bureau ran the computer 24 hours a day the decennial census data processing was done. Howard Brunsman, Chief, Population Division was looking at the computer data-processing operation to some degree, and at first he felt that the best thing that the Bureau could do with the computer was junk it.

O'Brien: **He later became a convert and traveled around the world. That was his meal ticket around the world.**

Hansen: Indeed he did. He got interested, started working on it, and got fascinated by it. We did have our troubles using computers. For many years after the first computers were used, problems would always occur. Brunsman would look at those troubles, but as he began to get involved and interested, he would look ahead, and he was one of the best supports of using computers.

O'Brien: **It ended well, even with the troubles.**

Hansen: It ended beautifully. Then one of the things that came immediately into consideration was editing and coding on the computer. Certainly this was one of the major areas that began to take over as we moved ahead. One of the principal issues was how to integrate manual and computer operations. In some divisions, subject-matter employees were involved, like Population Division staff; in others, it was

handled by people concerned with methodology. I am sure that it was from the population program that we began to deal with problems of nonresponse and a hot deck procedure. These ideas got incorporated in the census, and there was a lot of sophisticated work in that 1960 Census of Population and Housing on editing and coding. The philosophy was to let the computer do it and then print out doubtful cases and manually intervene if changes were needed, rather than just print out the problems and manually work on them and decide what to do. Let the computer dispose of them and decide if you want to live with it or alter it. There was a kind of sampling philosophy also involved in the procedure in that the Bureau introduced the use of hot decks in such a way that the same characteristics were not replicated.

O'Brien: **You limit the number of replications.**

Hansen: Pretty soon I found books and articles published by others that did not credit the Census Bureau for that innovation, which amazed me. I may be wrong. Maybe I do not know what others were doing at the same time. However, the agency was years ahead of others for a while.

O'Brien: **It seems to me that the hot deck is greatly underrated. When I first came across it, I said now that is a simple idea and such a sensible one, and it takes advantage of what I see as a kind of fundamental serial correlation. You walk down the street and the kinds of people who live side by side tend to be the same kind of people.**

Hansen: You can take advantage of the geographic contiguity in a population census, but at the same time you can put in other restraints. They have to be similar in certain other characteristics. You could look for the nearest doctor if you wanted to.

O'Brien: **It is a beautiful system. I was just fascinated by this remark today because on this committee that we have been working with, the general philosophy was what you are doing is passe, and I have never accepted it yet.**

When I came here, one of my early assignments was working on the agriculture census, and people there said something that was very obvious. If you just look at a soil map, you see that there is a tendency for certain kinds of soil to persist over a wide area.

Hansen: You bet you do. Tremendous interclass correlation.

O'Brien: If you want to find out what the yield is on a given farm, what could you do that would be better than to look at the neighboring farm or you might look at the neighboring farm that had the same kind of irrigation or some irrigated soil.

Hansen: Subject to restraints.

O'Brien: Yes, subject to restraints. A neighboring farm of the same size that seems so natural that it is a great idea. I am not at all surprised that it beats a lot of other fancier approaches.

Hansen: I think Census did a great amount of the development in that area. I am not sure they ever got public credit for it. There must have been a few articles written. Indeed there is one article that has my name on it—Ogus, Pritzker, and Hansen, and maybe Hurwitz's name was on it also—hardly anything didn't, but I am not sure. This was on the philosophy of editing and its application in the establishment surveys and censuses. I have a feeling that sometimes an academic writes and publishes an article in a journal, and it looks like that is where it originated. I think many of the things that the Bureau did, and still does, to solve problems are still attributed to others because they publish articles on the topics. The Census Bureau did not get all the credit it deserved. I am not complaining about that, but I thought it was particularly unfortunate that recognition was lacking on where I think the ideas and applications really came from. This is the same point I made earlier today that when you have a problem to solve, you find ways to solve it, you are creative, and I think that is what happened.

O'Brien: You referred this morning to the work that was done on FOSDIC [Film Optical Sensing Device for Input to Computers] by Leighton Greenough. Were there any other developments that you can recall where Census prodded, coaxed, or urged people to get things done? I guess internally you developed a very sophisticated camera system?

Hansen: We certainly did. As the Bureau was approaching the 1960 Census of Population and Housing, it was looking at the second generation of computers and none of them looked quite right to us in terms of what could be done, because of the really higher speed computers were running. You know, I am so far away from this, I once could say this right, but I will say something that is a possibility. I have gotten out of the computer business. Here is a rough approximation. UNIVAC I was strictly serial, nothing in parallel, whereas some of the equipment that was coming out of Remington Rand and the International Business Machines Corporation had parallel computing. Census persuaded the Rand Corporation—it was then Sperry

Rand perhaps—and went through a sequence to consider putting buffers on and maybe certain other things, but I at least remember putting buffers on that kind of computer to give us a much higher speed computer than the Bureau would have had. They had a 1101 computer out if I remember the numbers right, which did not have the facility that we wanted on it. I do not think it had the right tape units on it either, and the Bureau persuaded them to put the right tape units on it and buffer it so the agency could get effective input and output with masses of data. In that process, I might mention who was the head of Rand Corporation when they merged with Sperry Rand.

O'Brien: **Do you feel you want to move on?**

Hansen: Well, let me say a word more on FOSDIC. There was a lot of discussion on FOSDIC whether to still try to do mark sensing, reflective reading, or to go through the microfilm process. Greenough [M. Leighton Greenough, an electrical engineer at the National Bureau of Standards, worked on FOSDIC for the Census Bureau] was told that he could just do it better if he went through the microfilm process. It was more reliable.

O'Brien: **When you said reflective reading, you mean direct reading from the paper—direct production of tape from the paper rather than using the intervening photographic process.**

Hansen: Yes, that is exactly what I mean. By somehow reflecting the light from the tape and the dots on the tape, this would reflect in such a way that the information would be read or not read. It was perfectly feasible. It was being done. Greenough did not feel that procedure was reliable. The Bureau concluded also that it had always photographed these questionnaires anyhow for the final record, it was not costing us anything, and it was giving us a reliable system. So, the agency went with the microfilm approach.

O'Brien: **MacRae Anderson [Chief, Engineering Research Branch, Computer Facilities Division at the Bureau worked on FOSDIC], Bob Varson [Robert J. Varson, Assistant Chief, Engineering Development Laboratory], and Tony Berlinsky [Chief, Engineering Development Branch] did a lot of the work.**

Hansen: It was Berlinsky who took responsibility for improving FOSDIC, with advice, I guess, here and there, for second generation FOSDIC. Well, I think FOSDIC was really a success without some of the growing pains the agency had to go through on the computers. Not that there were not some problems, but they were not anymore

than one would expect with any innovative thing like that. The need for something was very great, and the Bureau wondered how it could do that. Census went to the Bureau of Standards, and it said this is the way it proposed to do it for you. Census looked at the total system and said that was the weak spot in the system.

O'Brien: **I have made the comment in some meetings recently that you met with Eckert and Mauchly in 1944, and by about 1954 the Bureau had a working computer and a FOSDIC prototype that was working; so, in the space of about 10 years, Census really leaped across a major chasm. I do not believe there has been any fundamental change in the way that the Bureau gathers data or processes them since it introduced FOSDIC.**

Hansen: That may well be true. The computer reached its effective performance in 1951 when I took it. For FOSDIC, I am not sure.

O'Brien: **I believe it was around the mid-1950s.**

Hansen: The Census Bureau certainly started the work early. The agency started with the Bureau of Standards before the 1950 Censuses of Population and Housing was being taken. The Bureau worked with the Bureau of Standards because Census was, as always, working on the next census while it was doing the existing one. So, the Bureau started working with the Bureau of Standards; it did the development and the testing of the system while the Census Bureau provided the financing. Greenough came to Census and worked here much of that time.

O'Brien: **Did you have any other comments on electronics or technology—hardware in technology?**

Hansen: Not really, I guess. There are all sorts of things to be said.

O'Brien: **I would suspect that the first computer and the first FOSDIC is enough work for one afternoon.**

Hansen: The next thing is progress on the use of administrative records. Obviously, an early use of them was what has led to the improvement of the county business patterns series. The kind of work with administrative records led to the development of the Standard Statistical Establishment List used in the economic census and survey programs. I guess seeing the potential and doing it was important. Grieves had an important roll in that along with the other subject-matter people. I do not know how well you knew Howard Grieves [Deputy Director of the Census Bureau 1965-1967].

O'Brien: I did not know him well. I only had a couple of dealings with him when he was in one of his gruff phases. I never got to know him.

Hansen: He was a smart and impatient guy.

O'Brien: Grievés was smart, tough, and sometimes abrasive.

Hansen: Yes he was. I guess he was the best support the Bureau could have had, and I am talking about support from the top staff. He provided the best kind of support to the Bureau for years. Here and there he pushed things a little faster than I wanted to see them pushed. Two or three times he was right, and one time I think he was wrong. During the latter part of my career at the Census Bureau, it was pushing hard to use administrative records to the fullest extent in its economic census and survey programs. Census was moving along that line, and Grievés decided: “by golly, there is enough information there that would permit the agency to forego collecting some information in the census and input the data from administrative records. I think that development was a major step forward. Instead of collecting data for all establishment, the Bureau could obtain the information from a sample of small establishments.

O'Brien: Yes, and you can use that as a regression.

Hansen: Yes; that would greatly reduce the cost and burden on small establishments. People talk about burden on businesses, and I think it is hogwash. Unlike what many parts of the Government says, like the Office of Management and Budget, it does not cost people anything in terms of the number of hours to complete a population census questionnaire. Many individuals are interested. The same thing with the Current Population Survey. Most people are pleased to be interviewed now and then. A small subset of people write editorials, but by and large in the population area, the burden I think is not going to be great.

In the business area, I think burden is real, and it is major step forward to push those things through, instead of doing research on them for another decade, and then pushing them through. I would have done the latter, Grievés did the former, but he did it with our participation, support, and approval.

O'Brien: It is refreshing to have someone who is straining to reach. . . Jim Corbett [James P. Corbett, Principal Researcher, Operations Research Branch] use to speak of the difficulties of trying to push a string through a pipe.

Hansen: Where is Jim now?

O'Brien: Jim has retired, and he now lives in Florence, Massachusetts. His wife, I think teaches at Amherst and occasionally travels to London. She is a classical Greek and Latin scholar. She, in effect, can get a job in London any time she wants and stays as long as she wants—its one of those classic places.

Hansen: And he follows her?

O'Brien: Sometimes he does and sometimes he does not.

Hansen: He was an interesting guy.

O'Brien: Yes, very interesting. Very versatile intellectually and artistically.

Hansen: I did not know him that well, personally, to know he was artistic.

O'Brien: He was an accomplished artist and musician and had a special kind of sense of humor.

Hansen: Well, there were related developments in administrative records that were interactive also. There are such things as getting population data for small areas, income data for small areas from the tax returns. So, I think that was a broad operations research kind of approach. The whole job of what you are doing needs more than just a limited perspective. Then, there was a group that came in from a small-area committee; it was a new influence in the Bureau, a wholesome influence, a bunch of people that I think were basically academics. Interaction between them and the operating staff was also very good. They brought the same thing that we did—group perspective.

O'Brien: One of the specific areas I wanted to take up later, was your reactions to the whole array of committees that you dealt with, and you established in some cases, through the years of special panels.

Hansen: We can divert for a minute and come back, if that is okay, because it is not going to take long to say what I have to say. I think, by and large, these groups are very useful, if they are used properly. I guess my feeling was that now and then they provide good ideas. Now and then you get something new and different, but I do not think that is what you bring them in here for. If you get good ideas, that is a bonus. Mostly, you get one or two things. First, summaries of what the Bureau is doing have to be prepared. It is related to what I said earlier about writing. When a person is forced to write things out that creates a record (which is important to have), that activity creates a better understanding of what you are doing or plan to do, and it also forces a person to organize his or her thinking. I think that is one of the great

purposes derived from bringing together these groups. Second, the committees become a sounding board and provides interaction which may raise useful questions about what the Bureau is doing or plans to do. The committees prevent the Bureau from doing something that may prove to be disastrous. These committees or panels cannot be expected to come to the Bureau and know more about what Census is doing when it is spending months at on a particular program and they are spending only days considering the program. However, they can provide a new perspective. So, when I worked at the Census Bureau, I found them useful.

O'Brien: **They were, I believe, all pretty well established mathematical statisticians with specialties related. . .**

Hansen: Indeed they were, leaders in the field. Bill Cochran was; you could not find a more able person than Bill. But even there, we did not expect, and they did not come to the Bureau, to “turn us around” very often. They came in and worked with us and talked through things. Most of the time they and the Bureau learned from the experience. It was not a one-way street by any means, and it was well worthwhile. Another aspect I started to mention but I did not quite get out is the benefit the Bureau received when it has someone out there who can speak for the agency. I wondered why the agency has not had the expert panel in recent years. After I left the Bureau, the panel of experts were not used again, as far as I know, except as an occasional event as distinguished from a permanent forum. We had a meeting about two or three times a year.

O'Brien: **With the Carter Administration, the law and regulations said you could not have a panel unless it met certain criteria; those criteria really ruled out an elitist panel.**

Hansen: Well, there was probably a perfectly strong reason there.

O'Brien: **We have had some ad hoc panels for a couple of days.**

Hansen: What the Bureau could do then was say that it had talked with this panel about a particular issue. This gave the Bureau credibility. However, the changes we have seen during the Carter Administration and the Reagan Administration seem to carry the philosophy that advisory panels are made up of people who are only promoting its own welfare and feather their own nest. Maybe that is the way a lot of them are, but that was not the way they were when I was on an advisory panel or when I had them in.

O'Brien: Vincent Barabba [Director, 1973-1976 and 1979-1980], who became Director the first time in the Nixon Administration, said that he thought, from the briefings that he got, that the advisory committees were a great boondoggle, and it was a way that you rewarded your friends. He was quite surprised to learn, first of all, that they contribute their time, like you today, without consulting fees. This was no great boon to them.

Hansen: Wait until you get my bill.

O'Brien: Second, he thought it was a good bargain that the Census Bureau had them; even if they had charged, he would have thought it was worth it.

Hansen: The Census Bureau did pay the panel of statistical consultants a modest fee. Nothing that amounted to anything. Census expected to use them a little more frequently than your standing committees. That disposes of advisory groups, unless you have more to ask.

O'Brien: No, I think that is very interesting. It more or less parallels my own experience with them, except that I really felt that it was too bad that the agency was not able to get the benefit of something like the panel, more or less, as a regular standing body which became acquainted with Census problems over a long time.

If this is an appropriate time, I would appreciate some of your comments on quality control at the Bureau and your involvement with it. Particularly, whether or not you believe that the Bureau followed the policy that is sometimes described as the point of view that if the Census Bureau carries out an operation, if it is important enough for us to pay people to do it, it is important enough for us to check to see that it is done right. Sometimes that check can be done routinely as part of a later operation. Sometimes that check has to be done by a formal systematic, statistical quality-control system. In general, whatever the Bureau does ought to be checked to see that it is within acceptable limits. Some people, including some extremely smart people who are running other statistical agencies in town, have found that an interesting point of view, but one that they regard as hopelessly idealistic by comparison to their own view of what one can do. I wondered whether you had run into that philosophy.

Hansen: You state the point of view pretty well. I will elaborate a little as I see it. Let me say first that I have run into some other agencies in my WESTAT work. I am amazed at the reaction for proposing quality-control operations and quality-

evaluation operations; some of the people working with those agencies will not tolerate that.

O'Brien: **You mean they are unwilling to pay?**

Hansen: I am not saying the agency is unwilling to pay for it. They say if you want to check on the field work being undertaken, the people will not tolerate having their work checked on. You have got to keep their good will. That seems to me to be pretty intolerable; however, it is true that you have got to do it in a rational way. You have got to go out and check on people and make it a routine system; it is part of what you have to do. The philosophy that you stated is to do a good job. Let me start by distinguishing two things which are not always so distinguishable. The first is a quality-control system and the other is an evaluation system. In a quality-control system, as I see it, a person provides feed back which affects the operation while it is going on; you may not have a quality evaluation of what you did, because you changed it in the process of administering the quality control. The second is an evaluation system in which the feeding back takes place over a longer time cycle.

O'Brien: **I see quality control as affecting the quality during the current cycle, and evaluation affecting the next cycle, which may be 10 years away.**

Hansen: It may be 10 years away, 1 month away, or 6 months away. Some programs are actually both—a process-control system often affects the future and not the past. Sometimes you are doing evaluation only in the sense that you do not have any thought that it will affect the short run stuff but will impact long term operations. All I want to say is that I endorse what you were saying basically in respect to both of those; you need, at least, to conduct evaluation studies and report on the results. You do not have to spend your total appropriation on it. You certainly have to give it serious attention. For the field work in the Current Population Survey, for example, we wrote an evaluation paper on it. It reported that about 25 percent of the cost was related to quality control, training, and evaluation, including such things as the observation, the reinterview, and the training programs. That is a pretty fair amount of funds. For a study as important as the Current Population Survey, if it takes that amount of funding to keep the survey under reasonable control, it better be paid.

O'Brien: **Sometimes, but probably not as much as the Bureau should.**

Hansen: I used to go out and do some interviewing in an enumeration district. Either I, or two or three of us, took an enumeration district in every census. One of the things we saw, especially observing interviewers in the Current Population Survey and the business survey was that enumerators were not trained very well. You are sort of

frustrated that the instructions were not being followed carefully. Then the Bureau introduced these programs whereby we observed them. My impression of the observations in later years was that the enumerators really know what they were doing, and they did not always follow the instructions, but they were smart enough to know that they had to deviate from the instructions. Enumerators had to interact with the respondents. By and large, they knew what they were doing; when they deviated, it was in a sensible way. In spite of all that, the Bureau still has those gross differences and measurement problems that need more research. I was impressed when Census brought the Canadians here, and they talked about what they observed. The Bureau swore the Canadians in as census agents so they could go out and observe. They said that their people were not under the kind of control that ours were. I think they instituted some quality-control programs. It is one thing to have a control program where people do what they are told to do, and deviate in reasonable ways, and the other is to have it without error. The second does not follow the first.

O'Brien: **I think the second certainly is unrealistic, without error.**

Hansen: To me, it is important to evaluate and to publish the results—that is, the evaluation results as well as the data. It is the kind of integrity and openness that I think belongs in a statistical agency.

O'Brien: **Did you find, Morris, that there was continuing resistance toward quality control? It certainly seems, at least recently, that there has been.**

Hansen: In what setting?

O'Brien: **In the setting of the 1980 Census of Population and Housing, it was the judgment of some people who were involved in quality control in the processing areas that there has never been a great deal of enthusiasm for quality control by the people whose quality was being controlled, either by the workers, their supervisors, or in many cases the line managers.**

Hansen: What form does the resistance take? Let me ask my question better. One form the resistance could take is say the Bureau wants to inspect 100 percent of the work, which is what they used to do in the census. The other could be Census does not need that inspection; it knows what it is doing, does not need any formal inspection, and it will evaluate in an informal way. The supervisor knows where the bad spots are.

O'Brien: It is more in the latter direction. The agency does not really need all this fancy apparatus of formal quality control. There are ways that the Bureau can subtly sabotage it by not putting the right people on it, or by canceling the evaluation for a certain period.

Hansen: It costs money, and we are going to save it.

O'Brien: It costs money and it holds up schedule; therefore, some say the Bureau would like to do it if the agency could afford to, but unfortunately it cannot.

Hansen: I am not sure Census did it very much where it would hold up schedules. In the context of the decennial census because it would not be able to collect data on schedule.

O'Brien: Holding up the schedule may result if a lot of work is rejected. The rejected work has to be reworked. If you say that it is quality control that is causing the schedule to be delayed, it is really poor work.

Hansen: If it is poor work that is causing it to be delayed, the Bureau better be prepared to pay that price.

O'Brien: I was wondering if you encountered that back then, or whether there was something like an esprit de corps, or some kind of message.

Hansen: I think the agency encountered some of it. I think because the setting Census was working in was one of moving from 100-percent inspection to sample inspection. Now the agency inspects on a sample basis.

O'Brien: That is an interesting point.

Hansen: But I am sure there was some of what you were saying too—a feeling on the part of supervisors, especially in connection with field work, that the Bureau knows where its “weak people” are, where it has to focus its attention. The Bureau always said a person should have latitude in situations where problems exist. In addition, Census has to have quality control, and it is worked well. I think what you said is essential too: “If it is worth paying for, it is worth understanding what the Bureau has as to quality.” The second measurement is not truth either.

O'Brien: But hopefully it is better.

Hansen: Yes, and you at least better understand what the process is, what the gross differences are. Some of the process is taking corrective action, and some of it is understanding what you have.

O'Brien: Your remark reminds me of a comment that I heard when I first went to Istanbul. A wise Turk said that many Americans are extremely frustrated and annoyed with Istanbul and with Turkey in general, because Americans approach things from the Western approach. He said, if Americans approach things from an Eastern cultural sense, they will see Istanbul really as an up-to-date, modern city by comparison with the hinterland. Whereas if you approach it from Rome, Berlin, Paris, London, then it seems backward.

Hansen: You are right, we wind up with some of that. Certainly the philosophy was there more in the field work than in the processing operations.

O'Brien: **There have been recent examples where there have been problems in connection with data processing.**

Hansen: It is a little harder if you are holding up work because it will not “pass” unless you have got the right standards, and you have to be careful about that.

O'Brien: **Yes, if you have unrealistic and unreasonable standards, you change them.**

Hansen: If that is what is holding up the work, then it is a little hard to justify it. What ought not to happen is to get rid of quality control instead of changing the process. You do not inspect the process and correct the errors; rather, you look at the system.

O'Brien: **Get the system functioning correctly. Do you have any recollection as to whether there was what you regarded as a rational way of setting acceptable and objective quality limits you thought was better than just the application of sound managerial judgment?**

Hansen: We always talked about looking at this as a problem, extending the response-error model to estimate the contributions to variance and the ways in which errors come into these processes. I think if you really understood the errors that are coming into the processes, you can improve the quality control side, as the Bureau did on the sampling side. However, that is easier to say than to do. I have to say that the agency talked about it, but I do not feel that it made much progress; I do not think that means that progress cannot be made. I think that it was not one of the Bureau's top priorities. The agency associates cost with these features, and it, in a sense, optimizes the spending of its resources. The one thing that I think that Census did that needed doing was to look at the goals, determine how they could be achieved, and figure out what resources were needed to achieve its goals. There is a tendency to assume they must have found the best way or they would not have done it for 100 years or 10 years. That concept must be cast aside. It is a little hard to evaluate

those quality-control errors; they do not simply jump out. I do not think the Bureau ever worked at it seriously either; the agency talked about it, and it just was not done.

O'Brien: **I believe Ben Tepping [Benjamin Tepping, of the Bureau's Statistical Research Section] and Tom Jabine [Thomas Jabine, Chief, of the Bureau's Statistical Research Division] did it for awhile, and they came to the conclusion, which Tom thought was a little disappointing, that the main contributors to errors were the interviewers. By comparison, even error rates, which you previously regarded as bordering on the scandalous, were quite tolerable because their contribution overall to the variance was overwhelmed by what the interviews had done.**

Hansen: Well, that might be so, and that leads me to somewhat alter what I said; you cannot expect to have people working in large-scale operations, lots of people working, without giving them some feedback on the quality of what they are doing and understanding. You can put your sampling inspection rates at lower levels, but I do not think you can eliminate them.

O'Brien: **I agree. I think the feedback is really a crucially important part of both training and of keeping people motivated.**

Hansen: I am reminded of the discussion the agency had with a panel of statistical consultants on essentially this issue. I said you could observe the difference in the way the interviewer operated, but the Bureau was not able to prove what it got out of quality control in the Current Population Survey. When I said Census was spending 25 percent of its field work, that is exaggerated a little bit, because the supervisor has to be there anyhow. If the supervisor was not doing it this way, he would be doing something else. The Bureau was not able to show what the reduction in errors were. Does the agency carry on the system, does it cut it out, or does it reduce it? The panel judgment, with a unanimous voice, was that you carry it on—we have got to pay this kind of a price to have credibility.

O'Brien: **Was this the judgment of the supervisors?**

Hansen: No, the panel. I cannot say anything about the judgment of the supervisors. There is a question about whether you pay this price or you cut the price in half. If you can cut it in half, then you really cannot measure if your conclusion is that all the errors are really in another place. I think you still have to carry on the system if you can make good use of its magnitude.

O'Brien: Do you have anything further on quality control?

Hansen: We got interested in the problem of dependent versus independent verification. I thought it was an interesting area for development, but I do not know that the Bureau ever did enough to really establish good rules. I think it deserved more work, the last I knew about it.

O'Brien: Well, more work has been done, and some of the results that turned up have dismayed me, partly because they shattered my preconceptions and partly because they make the job a lot harder. Tom O'Reagan [Robert T. O'Reagan, Statistical Research Division] has done some work on process control. Essentially, his conclusion is that there is no way that the agency has yet found a way to predict who will be coders next month. The Bureau compares error rates this month with error rates next month, and the correlation is not statistically significant.

Hansen: It is frustrating, but you would expect that to happen if these people are all pretty good. If they were terrible, then you would not expect that to happen. That is what you would expect to happen if the system is essentially under control.

O'Brien: One possible explanation is that the system has a lot of "noise" in it, and it may be a shade better than a random assignment of numbers; however, there seems to be a lot of randomness in the system. In every other field of life, if a person graduates first in his class from grammar school you would expect that he would do reasonably well in high school.

Hansen: I thought Census had established what you are saying did exist earlier.

O'Brien: Yes, but the people who were capable of achieving a high level of quality and productivity, and produce low error rates, should be identified, trained, and motivated if they continued to work at those levels. Recent information suggests that the correlations are much lower.

Hansen: If they are basically doing a quality job, that is what you can expect. If the quality is terrible, this question of a lot of "noise" is relevant to that.

O'Brien: If the “noise” is all below 1 percent, then it does not really much matter. If it is bounded at a level that is quite acceptable, then it is really not crucial whether the number is .2 this month or .8 the next month. If there was a change of 4 to 1 from one month to another, it seems at first to be impressive; however, .2 to .8 is really all downhill; it does not matter. I gather it is not at that level. I find it dismaying because there is no clear answer. It seems to me that one should look more deeply into nonstatistical factors, maybe psychological or motivational, to see what it takes to find the people who really do well and who will consistently do well.

Hansen: Another topic we have is Dual Independent Map Encoding. I do not have too much to say on that. I guess Dual Independent Map Encoding was partly an outgrowth of, as I saw it, a group of academics that the Bureau brought in as a committee to consider on small-area statistics. These individuals had been doing a great deal of work on digitizing maps. They had ideas of what ought to be done, and I think they influenced Census in an important way to move in this kind of direction. The Bureau had a bunch of kids that had gotten excited about it and went after it. We would give them support, but they did it.

O'Brien: **There was Jim Corbett who provided the key intellectual thrust.**

Hansen: I think the Bureau created an environment that they could do that in. The work was essential. I should add one other piece to this topic. Some of that came out of the address coding guide. Some of the people working in the industry area were getting stuck, and they needed address coding. They made big progress. These youngsters took advantage of that and went on to doing the kinds of things Jim Corbett was pushing. I think it was a big development, and I have been terribly disappointed that it has not had a faster impact on the world than it did. I guess that is partly because when the work was first started people thought it was going to solve a lot of problems, but it was much more difficult to achieve. It stems back to what I started to say about administrative records. You really cannot move real fast until you have a geographic coding system that contains very few errors.

O'Brien: **Zero defects.**

Hansen: You could work it fast, and you could go from coordinates back and forth to areas in a hurry. You would have the world by the tail in terms of using administrative records. The agency set up operations that were supposed to get all sorts of these things going in local communities. I think Census made a lot of progress, but I am

not sure where it stands. I have a feeling it sort of petered out. Where does it stand?

O'Brien: I have not kept up with it. A couple of years ago when I did have responsibility for it I had the clear impression that people had bought our systems; in some cases they had changed them and made them a little fancier on their own. They were using them more or less routinely. Like you, I do not have any direct feel for how much it has changed the world. One thing I do have a much better feel for is that the Bureau's Geography Division has been converted. They tended to wax and wane in their acceptance and enthusiasm for the Dual Independent Map Encoding system. I think that they now recognize that it is a rational, well rooted way of doing the plans for the 1990 Census of Population and Housing, and cooperation is very good with them. They have been quite open.

Hansen: This is something where various record systems get brought into a system and the whole thing becomes more coordinated. Well, it holds great power.

O'Brien: I feel it is on its way within the Bureau. I guess I am reasonably satisfied that it is. I think that it is very likely that it is going to become a permanent part of what the Bureau does geographically. I do not know the extent to which it has changed the world outside. **Morris, let's turn to the question of coverage measurement during your tenure at the Census Bureau.**

Hansen: We started with the post-enumeration surveys, which were basically successful in that the agency identified the under coverage due to missed housing units. The Census Bureau took steps that it thought were effective to improve that substantially, such as the post office check. But with respect to the other types of under coverage, the agency was not able to identify in the post-enumeration survey effectively enough to get clues as to what it was and how to deal with it. Presumably, the missed people in housing units were individuals not associated with housing units or with different degrees of association with housing units. People did not want to be counted in the census. There is not much you can do to get them to want to be counted if they do not want to be. I have a feeling if the Bureau wanted to pay the price of getting a good census, it could if it set up a registration system as they have in Scandinavia and some other countries. I think Census could improve coverage enormously that way. I do not think the registration system alone would take care of that. A registration system together with the census will help each other. Members of Congress and others have wanted to get away from identification systems.

We have gone halfway. So the Bureau does not want it bad enough or it would be prepared to pay the price. Now the other system, in addition to post-enumeration surveys, is record checks where I think the real hope is. But there are difficult and expensive matching problems that have to be dealt with. Then there is demographic analysis. Demographic analysis seems to me like it is much weaker now than it was in the past.

O'Brien: **Because of the undocumented workers problem?**

Hansen: Yes, because in the past the weak link in it was always net migration effects; however, at least the effects were small. Now it is a wide open question. So I do not think the Bureau can put great faith in that one, except for certain subgroups where the problem may be less important. The record checks look to me like it is the way it has to be done intensively and has the most hope. I once had a hope for another system, which I think could conceivably give us some evidence.

O'Brien: **What was that?**

Hansen: Well, that was a system of participant observers. I have a feeling this is at least worth a lot more exploration than the Bureau gave it, and I do not know how much has happened since I left. Here, you are setting up systems where you establish complete confidence and communication with people that live in a community, enough to report on a small group of people associated with households—people who come in and out of those households. Not too many households can be covered by a person because you would get away from the participant observer concept. One of the difficulties of this is that it gets to sound like it is out of the statistical perspective.

O'Brien: **It is mainly anthropological.**

Hansen: Well, it is partly an area in anthropology. I still believe that it is worth research to see if you cannot do intensive participant observation, professional or otherwise, in a set of spots. Do not try to do thousands of them until you learn how to “walk a little bit” with a few of them. Get some numbers that you can use for regression purposes to get a dependent variable that can be used and mixed with independent variables, which would permit to produce estimates for smaller areas. The first step would be to learn what it is for the country. Then, one should learn about the portions that are causing trouble, and maybe you can do something about it or develop other approaches. This would be doing what a post-enumeration survey was designed to do, but what it does not seem to be qualified to do.

O'Brien: **Getting the people who do not want to be counted.**

Hansen: Yes, or where the system just does not do it because they are mobile, and they are not involved in the system. It is a hope that I have always had, and the Bureau never got to exercise very much. The agency got a start on it. Census set up an ethnographic study. I have a feeling that there was some substance there, and it has to be proved. Maybe it is like some of these other things that gets hopeless, but I would not be prepared to accept that yet. You might look back at the report, the one that we did. Are you familiar with that one?

O'Brien: **The Valentine study? Yes, I am.**

Hansen: I think we got out of that Valentine study what we anticipated. This is, he [Valentine] believed that a lot of people were not in the census because they did not want to be counted. I am not really quoting him. This is my recollection.

O'Brien: **It is my recollection too.**

Hansen: If you could set up a participant observer system that worked, you could do some regressions and things on other variables and some adjustments if you just had a few hundred of these observations carefully done. Maybe at least you would begin to understand what is going on better. I have a feeling this might be done jointly and supported by other agencies too where the Bureau is trying to reach and understand the welfare population and things like that. Well, the steps the Bureau took and how it did them, I guess I have answered. I am afraid to say what I think might be an hypothesis as towards exploration. I do not think the Bureau has solved the problem as yet.

O'Brien: **What about the weaknesses of demographic analysis?**

Hansen: Demographic analysis has increased. Even in 1980, people were revising the 1970 demographic analyses numbers because they felt they had more confidence in them than they should have had. There are always weaknesses in those kind of numbers anyhow. People put out numbers, and pretty soon they "come to be true"; then this truth" is used to recommend actions. The idea of a paper now is to show that coverage estimation procedures were never intended to be precise enough for adjustment. Well, I think, I would not want to go along with that statement all the way. The Census Bureau was thinking of the desirable end that it would satisfy itself that it knew how to move to adjustment. The agency was not able to get good enough results, except with a procedure that could not be used for local areas; that is the demographic analysis procedure which never could be used for local areas unless

the agency tied that procedure to some other things. So, I do not agree with the statement that the agency never intended to be precise enough; however, Census was not hopeful that its first steps would solve all the questions. What was done was to improve what it did with estimation procedures and with knowledge gained in previous censuses to improve coverage in the next census. Again, one of them was the post office check. The Bureau regarded that as having proved its weight. Maybe there are other ways, but that is one way it felt it got something improved. Other ways were some things that the agency is not that sure of yet. Census also had evidence that vacant units were continuously reported vacant that were occupied. The Bureau took a sample of them and did some adjustments. From a sample, it is a somewhat dubious procedure although I think it is better than not doing it. For the most part, I think the Bureau was unsuccessful, except for those limited things it did on coverage. Census was still groping, and these activities things were well documented. You know, this research documentation that was started long ago, that you have there, covers almost anything that I would know about. I do not have files. I did not carry files away from Census, except one of papers and memoranda. I think these would all be in the research documentation as they appeared after the fact.

O'Brien: **Yes, we have the research documentation file and the series of evaluative studies after each census. What about Congress and its committees?**

Hansen: With respect to the oversight and appropriation subcommittees, I do not have any neat answers. I sat in on a lot of the hearings. All sorts of variations in the process, and I do not think I can contribute anything that would be useful to you.

O'Brien: **Okay. Do you recall any particular activities, events, or legislation that illustrated any notable successes with Congress or notable difficulties?**

Hansen: Yes, I think there were a lot of things that were notable successes. On the whole, if the Bureau kept working at it, I had a feeling Census could get things through committees. Sometimes it took some time. The Bureau felt as it moved into understanding things better that it could use sampling, for example, and do better with the quinquennial censuses of manufacturers and an annual sample survey; the agency proposed the legislation and it was passed by Congress.

O'Brien: That is a clear case of persuading Congress to accept a sample in place of a census.

Hansen: There was legislation authorizing the use of sampling in connection with the census. There are a lot of cases that could be cited; that is just one illustration. Another very important one concerned UNIVAC. The Bureau had to get authorization from the Congress to spend funds to support the development of UNIVAC. In this particular case, the agency had money that was either going to revert to the U.S. Department of the Treasury—it was near the end of the fiscal year—and the Bureau went to Congress and said here is an opportunity we better not miss. The appropriations subcommittee went along with it. I do not think it took a congressional action then, maybe it did. Census felt, at least, that it had to get the committee's consent, and maybe it took an action.

O'Brien: Do you have any recollection of the amount of money?

Hansen: It was on the order of a \$330,000; it might have been \$500,000.

O'Brien: Sampling and the UNIVAC are certainly two important ones.

Hansen: I think there are many others. I remember going in and being brow beaten again and again, even on funding UNIVAC. The Bureau went to Congress with great hopes, believing what Congress said—that in 2 years or 3 years the Bureau would have this and the world would be changed. It took 5 years or something instead of 2, and the world was not changing quite as fast as the Census Bureau had expected.

O'Brien: I guess during those intervening years it was difficult to answer why you did not have it yet.

Hansen: Basically, the subcommittee members were understanding, and they were proud of their participation in it.

O'Brien: Was the Bureau's relationship good, bad, or indifferent with the Office of Statistical Policy, a Division of the Office of Management and Budget? Can you remember particular programs or activities for which the Office of Statistical Policy was especially influential or critical in a positive or negative way?

Hansen: By and large I had a feeling that the Bureau had good relations with the Office of Statistical Policy. Census tried to keep it informed and involved in a limited sense. In many instances, I think it did the Census Bureau a great deal of good in the appropriations process. Once in a while that office cut something out the Bureau thought it wanted, but by in large the Office of Statistical Policy was supportive of the Bureau's needs.

O'Brien: **Morris, do you recall that Dr. Raymond Bye was in that office, and he had some proposals for something like Leslie Kish's idea of a rolling census?**

Hansen: I do not recall a Raymond Bye, but let me comment on what you are saying. The idea of a rolling census has been around and discussed for many years. There is nothing new about it.

O'Brien: **I was under the impression that someone who was in the position of, I guess, the Chief Statistician. . .**

Hansen: I think you have got the wrong name. There was a Raymond Bowman [became the Assistant Director for Statistical Standards for the Bureau of the Budget in 1955 (now the Office of Management and Budget), and he might have talked about that; we have talked about such things for years. One of the last things I did before I left the Census Bureau was to seriously propose a rolling census in the business and services area because we had a list to work from. The concept was to have a 20-percent sample each year instead of a census every 5 years. A rolling census had some disadvantages, and I thought the Bureau really had a chance to implement such a program. There is probably a memorandum around that describes it. I do not know if you could find it or not. In the population census, we talked about it, and in the agriculture census it was discussed again and again. Here, we were talking about an annual sample survey. We would have a tenth of a sample every year or a 20-percent sample every year. When the Bureau started examining that plan's details, the plan did not look so attractive.

O'Brien: **How did you see the Bureau's relationship with the Secretary of Commerce or with the Department's officers and staffs that had an interest in what the Bureau was doing?**

Hansen: I do not really have much of a response to that question. I never did feel like the Census Bureau had on the whole very much effective support or problem with the Department of Commerce. Census had to go through them, and that was probably a necessary coordinating step. Occasionally there was someone at the Department that did the Bureau some good. On the whole, however, there was not anything like the relationship that I thought the Census Bureau has had in recent years.

O'Brien: **Was it the Secretary of Commerce who pushed the great staff reduction in 1953?**

Hansen: It might have been; it was a case where the Secretary of Commerce did us some harm. But, case also illustrates that in the long run, the Department of Commerce

comes around. Until Eisenhower took office as President in January 1953, there had been a democratic administration for 20 years. There were a great many people in business and on advisory committees that the Census Bureau knew and communicated with in connection with the Bureau's work. These individuals told some at the Bureau that it might be surprised, and the agency should recognize that the people coming into the new administration believed what they had been saying; namely, that all sorts of things could be done to make things more efficient. Sinclair Weeks became the first Secretary of Commerce under Eisenhower. I found out Sinclair Weeks personally believed in the Republican philosophy. He went before the Department of Commerce's appropriations committee in connection with the then upcoming Census of Business and said he was looking into the Census Bureau's funding request for that census. However, he admitted that he had not had a chance to determine if the funding request was worthwhile or not. He was not prepared to support it. As it is, the Congress denied the request.

O'Brien: **The Census of Business?**

Hansen: Yes. I am sure there were other effects too, but the Census of Business was cut out. Then the business community got up in arms. This was one of their marketing tools. They set up a review committee; maybe they got Secretary Weeks to appoint the committee, which was headed by Ralph Watkins [from the University of Pittsburgh and a member of the Committee on Government Statistics and Information Services]. The committee determined that a business census was needed and should be conducted. The Committee felt that Congress was not serving business community by cutting the census out. As a result, Congress reinstated the business census one year later. Well, the other part of that story is that Secretary Weeks brought a bunch of people with him, an under secretary and an assistant secretary, who generally came in with the same attitude. I remember observing about a year or two later when Bureau staff was before the appropriations committee that the Department's people were now pushing as hard as possible to support the Bureau funding requests. The department decided the Census of Business was important for the public welfare.

O'Brien: **It was an expensive lesson.**

Hansen: Yes, and there are different times. Phil Hauser [Philip Morris Hauser, Acting Director of the Census Bureau from 1949 to 1950] used to be in the Department of Commerce, and I am sure he was a help to us when he went to the department for a while. Bill Shaw [William H. Shaw, National Bureau of Economic Research] too.

Still, on the whole, it has not been too good. I do not think I ever saw any period, except for this illustration or two that I mentioned, where the Census Bureau has been negatively affected by the Department of Commerce as it had been just a few years ago because of the controversy concerning the decennial census.

O'Brien: **You must have reflected on the Bureau's image of itself and the images held by outside organizations or individuals. Were there times when the Bureau was in trouble because it was not understood or did not explain its policy or goals very well?**

Hansen: I am sure there were, but I do not know how to answer that. I do not think I have any good beneficial comments to make on that. I think there is something related to the need for analytical work being done in the Bureau. By that, I do not mean advocating policy; I mean interpreting statistics, providing a better understanding of them, and helping people get access to the statistics. I think the Bureau has done a lot of that, and could do more.

O'Brien: **Do you look back on notable accomplishments of the Bureau as things where one or more individuals overcame the odds, so to speak, or was it a case of the circumstances being right for something to happen? Can you illustrate with a particular example?**

Hansen: By and large, I think a team approach is what has made things work. Very rarely is there a conflict that you do not resolve by joint work before you try to confront people. There were one or two of those in my career at the agency, and there were disagreements at the beginning, but gradually the objectives were met.

O'Brien: **One important thing in the Bureau's history is the integrity of statistics, or the separation of statistics from politics. Were there times when there was too much political influence on the Bureau? If so, explain the circumstances. If no, how would you account for the Bureau's success in keeping politics out of its work?**

Hansen: I guess you answer those issues one at a time. The Bureau has always stressed the need to maintain the integrity of its statistics as well as to keep its work separate from politics. I do not think I have seen much evidence where there was any effort to influence the data, as such, from the outside. I have seen some things that bothered me, but it did not amount to much—where someone got a release speeded up or had the release held back.

O'Brien: **Good news and bad news for the administration.**

Hansen: Not much of that, but I have seen some isolated instances. They are rare exceptions. I think steps were properly taken after some of that to “fix” dates when things to be released. More and more I saw there was less opportunity for that.

O'Brien: **I seem to remember that sometime around 1970 there was an issue about someone “killing” a release on poverty. It has been said that someone in the Nixon administration ordered that the poverty report be eliminated or changed.**

Hansen: This was after I left the Bureau. I remember it as something to be concerned about.

O'Brien: **That is the only case that I can remember which. . .**

Hansen: Well, after I left, there was a related event where Con Taeuber [Conrad F. Taeuber, Associate Director for Demographic Fields (Mar. 1968-Jan. 1973; previously, Assistant Director for Demographic Fields (Apr. 1951-Mar. 1968)] was basically invited to retire from the Bureau.

O'Brien: **And Bob Drury?**

Hansen: Bob Drury [Robert F. Drury, Deputy Director, 1967-1970] was given early retirement because there was suspicion people working at the Census Bureau were handling the timing of statistics for apportionment in such a way as to help Democratic incumbents. Now I was not here at that time. I am telling you what I thought I understood. There were suspicions coming from the Nixon Administration. Those things I am sure were not happening.

O'Brien: **I would be astonished.**

Hansen: That there were suspicions shows that relations were not very good. When new administrations come in, there is a big education process that takes place, and sometimes it is a very slow process. You see some of it taking place now in statistics. Your appropriations were cut; somewhat more money was then provided. There are big prices to pay, but not much in the way politics influencing the statistics. There was suspicion of influence on the numbers in the sense of timing. There were some minor ones that I thought were unfortunate when they occurred, and there were only a very few of them that I was aware of. Except in a trivial way, I do not believe there was too much political influence on the Bureau. There was a lot of discussion of political influence on the Bureau in the appointment of enumerators and field supervisors in the census, and there is no question that it exists; it is real; it is genuine. I do not think it has any influence on statistics except making them a little more ex-

pensive and maybe a little lower in quality; that is not devastating, but it is a handicap. There are those in the Bureau that say it is an advantage, it helps us recruit people. I do not happen to believe that.

O'Brien: **I have heard that. I was astonished to hear that point of view, but they made a better case than I had thought.**

Hansen: There is some arguments on both sides, but I never believed it. I believe that I am right.

O'Brien: **How do you account for the Bureau's success in keeping politics out of its work?**

Hansen: Well, except for those minor exceptions, it just seems to me that it's integrity; you build a reputation and keep doing the right thing all the time and do not cover anything up.

O'Brien: **Justice is on your side.**

Hansen: By and large, there are so many forces that are working on both sides that you do not dare go too far in tinkering, or you will get in trouble.

O'Brien: **One or two other questions, and then I think you may have earned a chance to get home. Can you think, off hand, of any thing that could have been done differently, or that should have been done differently?**

Hansen: I was talking about one of these at lunch, in connection with the 1980 Census of Population and Housing lawsuits. The Bureau took a position that it could not make available lists of addresses in the census. I wrote a letter saying, I think, it would be nice if, in the Postal Legislation that was enacted, lists were prepared before the census was taken; however, the Bureau took the position that the lists for the census were not made public, but were available for use by local communities. They would be for confidential use in checking on the census for their respective communities. I do not see anything wrong with making the lists public because I do not think they are basically confidential. To put it another way, when the Bureau faces an issue like this, I think the agency has vacillated on what is confidential and what is not. I want to defend confidentiality wherever it makes any sense, but I do not want to defend it when I have some grave doubts about it. I think this is one where I do. I do not know what it would do if you made these lists available. The information contained in the address list is already available to individuals in public sources. You are not going to name names, except where the name is the identifier, as in rural areas, and that is always the Jones' house. Everybody knows that. The

census has long had a history of publishing identifiable information in all of its censuses. There is no such thing as total confidentiality. I wrote a paper on this once, and it is available for people to look at. It is a question of where you draw the line.

O'Brien: **There is a little possible substance there. . .**

Hansen: You can imagine a worse case than publishing lists of addresses, names and addresses, or just addresses. The only place a name comes in is. . .

O'Brien: **For rural addresses.**

Hansen: Yes, for the address. It is pretty hard to make a case as strong as the one I made. I am not sure you would revolutionize or improve the quality of the census very much, but I thought you would improve the credibility of it, instead of fighting a suit from a side that does not make too much sense. For most places, it is not going to change the census very much. I just thought it was a good idea to take that approach. The letter I wrote suggested that should be introduced as a piece of legislation prior to the time the census has used the list. There is no sense in putting out census information and putting out post office information. Maybe you could not get the legislation passed, but I do not see why they would object either for this kind of use. I just feel the census has been too sticky on this one. They got a decision from the Supreme Court that may or may not make what I am saying even possible; I do not know. I did not look into that case at all. Well, that is one case in point, in response to this question. I am sure there are others, but I cannot think of them at the moment.

O'Brien: **The last question I have is one which Kirk Wolter [Kirk M. Wolter, Chief, Statistical Research Division, May 1983-Aug.1988] asked me to put to you. Recognizing that the end of a long day may not be the best time, but I believe it is no secret that there is widespread feeling around the Bureau that somehow people seem to have been more effective in the past than they seem to be now. I guess, in someways this is documented by major changes and the publications that came out. He wondered if you had any observation on things that were part of the magical chemistry.**

Hansen: That is a difficult one. In the first place, I think the Bureau had an unusually good combination of people, but I also believe, as I said earlier today, that the agency had unusually good opportunities. The time was right to strike, and we did. It made us look better. I think the Bureau was well enough staffed with the kind of people to take advantage of those opportunities. Once these things become sort of routinized,

unless something else comes along to strike, the Bureau did not get that magic reputation. This is partly reputation. The only way to deal with a less magical reputation is for the agency to do the job right and do it best. When it is worth fighting for, fight for standards when they are needed, and do not fight for trivia. There is a principle that if it is trivia, do not be too ready to compromise either. That is a hard one to answer. I know some of my old friends that worked at the Bureau. I am sure that they were some of the best that ever worked at Census.

O'Brien: **Oh yes, extremely capable people. Maybe it was the team work. It may be, I think, more emphasis on teamwork and working harder at building and developing a spirited teamwork.**

Hansen: That is conceivable because I think the agency had it. Part of it is that success breeds success, too. As I say, the time was right to strike and the Bureau did, and it succeeded. It made it easier. I do not have any other advice to offer. I sure think that a team approach is a very desirable one when appropriate. I do not know how you operate today, if you are sort of isolated or working jointly with the people in the regions, looking at their problems, and reexamine them. I think that is what you should be doing: raising questions, ridiculous questions sometimes, and not let them or yourself be prepared to assume that there is not much in the way of new things. I find new and interesting things coming out all the time for the census.

O'Brien: **Well, thank you very, very much, Morris.**

Hansen: It was a real pleasure.