Information Functions in National Information Economies

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Summary

- **Context**
- **My Research Project**
- **The Process to Date**
- **Conclusion**

Context

- ***Productivity of Knowledge Workers***
  - **Peter Drucker, who invented the term "knowledge worker" more than 35 years ago, said then that management's new role is to make knowledge workers more productive.**
  - **Thomas H. Davenport, in *Thinking for a Living: How to Get Better Performance and Results from Knowledge Workers,* published this past year, in 2005, has repeated that theme.**
- ***This is the context for my remarks today, but I am going to focus my attention on productivity as it relates to the use of external information and, more specifically, on the functions that are supportive of substantive knowledge workers in access to and use of external information.***

- ***Hiddden Slide***

Relevant Dimensions

- Library-like Processes
  - Selection
  - Acquisition
  - Handling
  - Descriptive metadata
  - Content metadata
  - Physical organization
  - Storage for use
  - Access for use
  - Archiving
  - Preservation
  - Information products
  - Information services

- Contexts
  - Libraries, Archives, Museums
  - Governmental agencies
  - Non-governmental agencies
  - Industrial companies
  - Individuals
- Types of Information
  - Textual
  - Numerical
  - Static images
  - Dynamic images
  - Audio
  - Physical items & artifacts
- Formats of information
  - Physical (e.g., print) forms
  - Electronic copy (digitized) forms
  - Electronic original forms
  - Persons

Roles of Information in Industry

- **In operations**
  - **assigning** **scheduling** **monitoring** **etc.**
  - **time keeping** **accounting** **inventory control** **etc.**
- **In tactical and operational management**
  - **allocating resources**
  - **controlling operations**
- **In strategic management**
  - **long-range planning**
  - **dealing with external environments**
- **In product development**
  - **research**
  - **product development**
- **In marketing**
  - **customers**
  - **competition**

Internal vs. External Information

- **Internal information relates to what happens within a company or agency, including data that derives from customers (as from a Customer Management System) and suppliers (perhaps from a "Supplier Management System"?) as well as internal operations.**
- **It is primarily important in operational and tactical management.**

- **External information is not derived from what happens within a company or agency but instead is obtained from external sources, such as consultants, publications, or the Internet. Such sources are examples of the Knowledge Industries, as I will define them.**
- **It is primarily important in strategic management, R&D, and marketing.**

Functions for External Information

- **The substantive functions – the USE of information**
  - **creation of ideas,**
  - **analysis,**
  - **design,**
  - **evaluation,**
  - **implementation**
- **The supporting information management functions**
  - **information acquisition,**
  - **information description and organization,**
  - **information preservation and archiving,**
  - **information product generation,**
  - **information services provision**

- **I use the term “library-like” functions in this presentation because those information management functions are well defined for libraries, with well established, relatively reliable sources of data by which library functions can be measured on a national basis.**
- **The extension of those functions, interpreted then as general information management functions, and related measures to other contexts and especially to industry contexts is a primary goal of the project.**

- *As an aside, I recognize that, in talking to a society of professional "information managers", I may raise concerns by using the term libraries or even "library-like" functions*
- *I further recognize that your companies and agencies have probably totally eliminated what in the United States we call "special libraries" (which are largely the industrial libraries).*
- *But, despite that, I will talk about libraries and library-like functions in both the United States and Croatia because they really are effective agencies and embody the processes for carrying out what I have just called "supporting functions". Believe it or not, librarians in Croatia as well as in the United States really do know what they are doing.*
- *More importantly, for my purposes, as I have said, there are relatively reliable data for library operations, reported on a national basis in both the U.S. and Croatia, and those data provide means for measuring the costs, effectiveness, and efficiency of those operations in libraries and, by extension, in industrial contexts. Such data are not reported for companies.*

Management of Information Functions

- **Efficiency of the supporting functions**
  - **My long-term interest is to find means to measure and evaluate efficiencies across all knowledge related functions and in the knowledge industries, but the one for which I can find readily available data is the efficiency of supporting functions.**
- **Efficiency of the substantive functions**
  - **However, that is also relevant to the substantive functions to the extent that, if the substantive knowledge workers are forced to handle the supporting functions, they are likely to be both inefficient and ineffective.**
  - **They will be inefficient for at least three reasons:**
    - **(1) they are more expensive labor,**
    - **(2) there is likely to be duplication of effort, and**
    - **(3) there are more important, substantive things to do.**
  - **They will be ineffective because the supporting functions themselves require specialized skills that the substantive knowledge workers are either unlikely to have or, even if they have them, do not use often enough to maintain effectiveness.**

My Research Project

- I was here in Croatia during May and have returned for September, October, and November of 2006 as the first stage in what is planned as a three-year project to investigate the issues that I have just outlined.
- In this part of my presentation, I will summarize that project, its objectives and methodologies.
- I will then conclude by illustrating the processes in the project with some of the results that I have obtained based on data I have acquired during the past month since I came to Croatia on this visit, as well as data that I already had concerning the United States.

Collaboration

- **This project is a collaboration between me, as the Principal Investigator in the United States (at UCLA), and colleagues and friends in the United Kingdom (at Loughborough University) and at several institutions in Croatia (National and University Library of Croatia, Faculties of Philosophy and Economics of the University of Zagreb, Economics Institute of the University of Zagreb, and Faculty of Philosophy of J.J. Strossmayer University of Osijek).**

- **The collaboration is one of the reasons for using the US, the UK, and Croatia as the countries of focus for this project. Because of the long-established working relationships on which the collaboration is based, the necessary data can be acquired and jointly analyzed.**
- **A further reason for choice of these three countries is that the US and the UK, being at roughly comparable levels in development of their information economies, can serve as calibrations for each other in the data analyses. Croatia, having a relatively less developed information economy, can serve as an exemplar for countries at a similar stage in development.**

Objectives: National Economic Policy

- **The transition of national economies from being based on manufacturing to being based on information is a reality throughout the world.**

- **It should be of concern in national economic policy, whether represented by intellectual property rights, by incentives for investment, by education and employment goals, or by any of the myriad other policy issues that are being affected.**

- ***In passing, it should be noted that the Croatian National Competitiveness Council is concerned with these same issues, and many of the 55 recommendations in their report of last year reflect that concern, especially those related to education.***
- ***I met with Željko Topić, Director General of the Croatian State Intellectual Property Office, and he is underway with a study that is quite parallel to mine, dealing with many of the same issues, using similar methodologies and, especially, data.***
- ***In the United States, Stephen Siwek has undertaken similar studies of the economic role of "copyright industries", and there are obvious relations beween those industries and libraries. Though the relations are sometimes adversarial, in this context there are more interests in common than in dispute. Both libraries and copyright industries want to see increased use of information in society.***

- **The 1st objective therefore is to provide results that can assist in making decisions about such policy issues.**
- **Among the national policy concerns should be educating the workforce that must make a transition from manufacturing and non-information services into the information economy.**
- **Traditionally, public libraries in the United States have served this purpose for generations of immigrants and as educators of the unemployed. Today, they serve as means for public access to both print resources and electronic resources as well as providing educational programs. A 2nd objective is to provide results that will identify the needs for such educational support and assist in determining what workloads will be.**

- As the wealth of information of value to business in general has increased, their means for access to it have not similarly increased.
- Of course, the technology is there but the library functions in searching and evaluating require special expertise and that is in short supply.
- A 3rd objective is to make industry aware of the needs they have for such professional expertise and of the means by which they can gain access to it.
- Academic and public libraries can serve as gateways for Internet access, with their highly skilled professional staff providing the necessary support.
- So a 4th objective is to assist the directors of libraries, especially of academic libraries, in identifying a new role for them.

- **Perhaps most important, there are real opportunities for entrepreneurs to establish businesses that will serve the needs of industry. Those entrepreneurs need to have a valid, comprehensive picture of the market, the demand, the customers for those products and services.**
- **A 5th objective therefore is to provide a framework in which assessments can be made of risks and returns, of needed investment and manpower requirements to support entrepreneurial development.**

Objectives: Social Policy

- **In considering objectives in the context of national economic policy, it is evident that there are social policy implications as well. A better educated workforce that can work effectively in an information rich environment means a better social environment.**

Objectives: Management

- **And in any listing of objectives, many of them represent management concerns, both library management and corporate management.**

Assumptions

- **The fundamental assumption for this project is that "library functions" represent necessary "information management functions" in contexts other than just libraries.**
- **A further assumption is that there are data available about libraries and national economies that are sufficiently well defined and reliable to serve as a basis for assessing the hypotheses that will guide the project.**
- **The validity of the second assumption is attested to by the facts of data available in the three countries (the United States, the United Kingdom, and Croatia) that will serve as the national contexts for this project. For other countries, the assumption would need to be tested and confirmed.**

Hypotheses

- **The central hypothesis is that economic costs associated with library functions, represented by labor and capital necessary for performance of them within national information economies, can be measured in a wide range of contexts, including libraries but also including industries of various kinds.**
- **A more specific hypothesis is that the costs for library functions within libraries can serve well as a basis for measuring those costs in contexts other than libraries.**

- *Of course, I assume that you, as "information managers", know what these processes cost in your own companies and agencies. You must get the periodic accounting reports that provide you, as managers, with the data you need in that respect. And you must evaluate staff effectiveness.*
- *The problem for me, as an academic and researcher, is that the data you get are not available to me. They are not reported in national statistics nor are there ready means to evaluate or even estimate what they are.*
- *And it is relevant to note that, while you may know your own costs for these information functions, you probably do not know the costs that are incurred in other companies or agencies. So the results from an academic study may have value for you by providing a basis for comparison and evaluation.*

Application of Models

- **Four models (Library Planning Model, Input-Output Matrix Model, Function-Industry Model, and Cobb-Douglas Production Model) will be applied to those data.**
- **Those models will be described later in this summary.**

- **The analyses for this project will be done in three phases.**
  - **Phase 1 will focus on traditional published materials, starting with libraries and then extending to industries**
  - **Phase 2 will focus on electronic materials, again starting with libraries and extending to industries**
  - **Phase 3 will consider not only published materials, whether print or electronic, but the entire range of Knowledge Industry products and services as used by industries**

Phase 1 Analyses

- **In Phase 1, the analyses will determine, first, the distribution of staff involved in "library functions" in libraries for *traditional published materials*.**
- **For this analysis, the Library Planning Model will be the primary tool; the Cobb-Douglas Model will be used for assessing the relative role of capital and labor in each of the library functions in delivery of information products and services by libraries (dividing them between those that are essentially capital investments versus those that are operational labor).**
- **The analyses will then determine the relative magnitude of use of traditional published materials within groups of industries. For this analysis, the Input-Output Matrix will be the primary tool; the Function-Industry Structure Model will be used to provide additional detail for that analysis.**

Phase 2 Analyses

- **In Phase 2, the analyses will again, first, focus on library functions within libraries but will do so for *electronic distribution of library materials*.**
- **For this analysis, data from libraries related to electronic distribution (which is increasingly becoming available as e-books and e-journals are being identified in library statistics) will become the focus of attention.**
- **Again, the Library Planning Model will be used to assess the effects of electronic acquisitions upon staffing patterns, for which data are also becoming available. There will also be an examination of the functions involved in the production of digital libraries to the aim of assessing the associated workload factors within the Library Planning Model.**

- **The analysis will then use the Input-Output Matrix as a means to extrapolate the data from libraries to estimates of the magnitude of electronic distribution of information for each industry group.**
- **This clearly is very speculative, since the data for Internet use are just beginning to become available. But the data from the Input-Output Matrix should provide a basis for at least establishing benchmarks.**

Phase 3 Analyses

- **In Phase 3, the analysis will focus on library functions (i.e., information management functions) within groups of industries, considering all all products and services of the Knowledge Industries. As of now, this analysis is speculative.**
- **It will first involve use of the Library Planning Model, with surrogates being used for acquisitions (the initial choice for surrogate being expenditures for Knowledge Industries products and services as derived from the Input-Output Matrix Model) and for user demand (the surrogate here being an extrapolation from data on use of libraries).**

Definitions

- **It is essential now to define the two major relevant terms as they are used in the project:**
  - **(1) Library Functions and**
  - **(2) National Information Economies.**

Library Functions

- **Library functions are essentially the functions and processes in "information management", in whatever context they may occur. As I have said, they are identified as "library functions" because there are readily available data about libraries and workloads on functions within them, that are reasonably reliable and reported on national bases in many countries throughout the world, on which economic analyses of those functions can be based.**
- **They are defined to include:**
  - **(1) Information Selection**
  - **(2) Information Acquisition**
  - **(3) Information Description (Cataloging or "Metadata Creation")**
  - **(4) Information Preservation and Archiving**
  - **(5) Information Product Development**
  - **(6) Information Services Provision**

- **Nine Hidden Slides**

Information Selection

- **These are the processes involved in selecting material to be acquired. They involve assessment of**
  - **(1) relevance of the material,**
  - **(2) quality of the material,**
  - **(3) reliability of the material,**
  - **(4) the nature of the source,**
  - **(5) the costs.**
- **They require a balancing of costs (for acquisition and for related processing) versus needs, on the one hand, and of costs of acquisition versus potential losses from not acquiring, on the other.**

- ***In passing, it must be said that, wonderful though the Internet is and rich though the resources available through it are, it requires expertise to assess the value of those resources and the sources from which they come. And that expertise requires long experience and deep knowledge of the nature of all information sources, both electronic and print.***

Information Acquisition

- **These are the processes involved in actually acquiring material, including ordering and paying for it, in handling the materials, and in preparing them for storage and use.**

Information Description (Cataloging, Metadata Creation)

- **Historically, of course, the formalized description of information was known as cataloging, at least in libraries, although the term “metadata creation” is frequently being used to represent the same process.**
- **Certainly, whatever its name, it is a crucial technical service, providing the means both for managing the collection of materials and for using it.**
- **In libraries, it provides the database for the OPAC (online public access catalog) and for both internal operations and services to users.**

- ***As "information managers", you have almost certainly been responsible for creating the data structures that are the fundamental basis for your internal information systems.***
- ***Whatever techniques you may have used in doing so, the records in those structures are counterparts of catalog records in a library.***
- ***However, there is a fundamental difference in dealing with external information in contrast to internal information: You can control the internal data and guarantee that it will conform to the data structures you have created. But with external information, you face the problem that it may not, in fact probably will not, conform with your data structures.***
- ***It is that problem with which the library must deal.***

Information Preservation

- **Preservation is one of the two imperatives for libraries and especially for major research and national libraries (the other imperative being access). It has two aspects: (1) preservation of the artifact and (2) preservation of the content. Each is important, but for different reasons. And in each aspect, economic issues are significant, again for different reasons.**

- **Even in the age of the electronic distribution and digital libraries, preservation is important, and there are major national and international efforts to assure that the records of the internet, just as an example, will be appropriately preserved.**

- ***I urge you to recognize that Preservation is not simply a concern of libraries.***
- ***As information managers, you surely know that archival records are not only necessary for operational reasons but for legal reasons.***
- ***The Enron case, in the United States, has highlighted the importance of these archival records, including especially those in electronic formats (such as the records of e-mail communications). And it has led to increasing demands, embodied in legislation, that such records be maintained.***

Information Product Creation

- **An “information product” is a pre-established package intended to meet the needs of a group of customers without essential change or intervention by staff.**
- **In libraries, examples of information products are the OPAC for a library and similar online databases produced and/or maintained by the library. Another example would be pre-packaged reference protocols.**
- **For libraries with unique special collections, digital libraries based on them are increasingly important.**
- **Packaged library instructional programs, either online or in person, are provided by most academic libraries.**
- **Some libraries take responsibility for production of scholarly publications.**

Information Services

- **In contrast to information products, information services respond to the need of individual customers (readers and others). Circulation of materials in libraries is certainly a service of primary importance as is individual reference services, whether face-to-face or online. Frequently, instructional services are one-to-one rather than pre-packaged. Many libraries provide consulting services; indeed, this is especially important in industrial libraries and information centers.**

National Information Economies

- **For purposes of analysis, national economies have been divided into "sectors", which historically included**
  - **(1) agriculture sector,**
  - **(2) manufacturing industries sector,**
  - **(3) services sector.**
- **Within the past thirty years, though, to those has been added**
  - **(4) information sector.**

- **The term "National Information Economies" is used in this project to represent segments of the "Information Sector" of the economy:**

  - **(1) Information Technology Industries segment,**
  - **(2) Information Transaction Industries segment,**
  - **(3) Knowledge Industries segment**

- **It should be noted that the Information Sector, in the Technology segment, draws its component industries from the traditional manufacturing industries sector, and those industries are therefore removed from the manufacturing industries sector.**
- **In the same vein, the Information Sector, in the Transaction and Knowledge segments draws industries from the traditional services sector, and those are therefore removed from the services sector.**
- **The latter point is especially important because there is still a tendency in discussions of national economies to treat the services sector as encompassing industries that in this project are assigned to the Information Sector.**

Information Technology Industries

- **This segment includes industries that produce hardware and software for telecommunications, computers, and a variety of other technologies that acquire, communicate, and process data (such as medical and scientific instrumentation).**
- **It is important to emphasize that this segment includes both hardware and software, the latter being the means by which the general purpose hardware (usually a computer in one form or another) is specialized to specific tasks. It is also relevant to note that the division between hardware and software is by no means absolute. There are many cases in which the software becomes embedded in the hardware**

Information Transaction Industries

- **This segment includes those industries in which the primary emphasis is on the processing of transactions which represent actions taken but have substantive value only in that processing.**
- **This includes telecommunications services, banking and related financial activities, retail and wholesale transactions, reservation services (such as for hotels, air travel, autos, tourism), and a wide variety of similar transaction processing contexts.**

Knowledge Industries

- **This segment includes those industries in which the substantive content of the information is significant. It includes education, research and development, the professions (law, medicine, engineering, architecture, etc.), and what traditionally are called "Miscellaneous Business Services" (e.g., consulting, related services).**
- **Most specific to the interests of this study, though, it includes the entire range of industries involved in publication and distribution of knowledge, including publishing, radio, TV, movies, the arts, the Internet. And, of course, it explicitly includes traditional libraries, archives, and museums.**

The Models to be Used

- **The methodologies involved in this investigation consist of a set of models and various sets of data to which the models will be applied. There are four specific models that will be used (beyond which are generic statistical models):**
  - **(1) The Library Planning Model,**
  - **(2) National Input-Output Matrix (Leontief Matrix),**
  - **(3) National Industry-Function Matrix, and**
  - **(4) Cobb-Douglas Production Model.**

Library Planning Model

- **The Library Planning Model (LPM) is a means for estimating staffing requirements to meet identified workloads on library functions in technical services and reader services. It will be extended to applications beyond just libraries as a means for estimating the staffing requirements for parallel or cognate services in non-library contexts.**

  LPM.xls

- **Some contexts, such as archives, are essentially similar to libraries, but others and especially industrial contexts are dramatically different. It is those contexts that are of special interest to the project. But the library and library-like contexts provide a useful starting point since the data are so well defined and reasonably reliable.**

- **Details about LPM can be found in Chapters 3, 4, 5 and 6 of Hayes, Robert M. *Models for Library Management, Decision-Making, and Planning*. San Diego, CA: Academic Press, 2001.**

- **To summarize, LPM is an Excel spreadsheet model with an array of macros that provide means for entry of data related to library functions in both technical services and reader services. The data include workloads for each of the functions and what are called "workload factors", which are the estimated times for staff to perform each transaction for each function. Given the entered data, LPM then provides estimates of the staff required for each function and shows the distribution of those staff by various categories of personnel. LPM provides a large number of other results (such as the needs for facilities of various kinds, estimated budgets, etc.).**

- ***If any of you is interested in The Library Planning Model and wish to experiment with it, I would be delighted to give you a copy, together with the associated documentation.***
- ***I can do so during this conference. If you have means for storing about 15 megabytes, I can make a copy directly for you.***
- ***Or, I can e-mail the files to you. Simply send a request to my e-mail address: rhayes@ucla.edu***

  and I will respond immediately or, at least, as soon as I can.

- ***There is no obligation of any kind except to properly credit me as may be appropriate.***

The National Input-Output Matrix

- **(known as the Leontief matrix) is a classical model that represents the purchases by each industry from each industry within a national economy. It also represents other aspects of the economic structure (such as Value Added and Import Purchases, on the one hand, and sales to various levels of government, to export, and to final consumers on the other).**

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Assignment & Coding of Industries

- **For purposes of analysis, industries can be assigned to categories so that inter-relationships among categories will then give a picture of the structure of the economy.**
- **For the US, the SIC (historically) and the NAICS (currently) are the standard coding systems for that purpose. It must be noted that the codes for the UK and Croatian data are not identical with the SIC or the NAICS, and they must be dealt with as they are defined.**

- **As a first step, the following matrix shows an assignment of industries in the US I-O Matrix to specific categories of industry that represents the approach that will be used in this project. It is quite similar to the NAICS except for separating the "Information Technology" segment from the manufacturing sector.**
- **During the progress of this project, the several coding systems (i.e., SIC, NAICS, UK, Croatian, and the ones listed below) will be reconciled, and the coding shown here is likely to be changed to be sure it best reflects the mix of coding systems.**

Code 1.00: Agriculture, Fishing, Forestry	**Code 2.00: Manufacturing Industries**
Code 2.10: Extractive Industries	**Code 2.21: Agriculture Related Mfg.**
Code 2.22: Extractive Industry Mfg.	**Code 2.30: Metal Products Manufacturing**
Code 2.40: Machinery Manufacturing	**Code 2.50: Transportation Manufacturing**
Code 2.60: Construction Manufacturing	**Code 2.70: Chemical Manufacturing**
Code 2.80: Personal Use Products	**Code 3.00: Services Sector**
Code 3.10: Transportation Services	**Code 3.20: Distribution Services**
Code 3.30: Personal Services	**Code 3.40: Power Services**
Code 4.00: Information Sector	**Code 4.10: Information Technology**
Code 4.21: Information Transaction Svcs	**Code 4.22: Financial Transaction Services**
Code 4.30: Professional Information Svcs	**Code 4.31: Information Distribution**

- **The coding here represents the assignment of activities within the US national economy into four main sectors (represented by the integral part of the category code):**
  - **(1) Agriculture Sector and related activities,**
  - **(2) Manufacturing Sector (not including information related manufacturing),**
  - **(3) Services Sector (not including information related services),**
  - **(4) Information Sector.**
- **The Information Sector has then been divided into three segments (represented by the first decimal position in the category code):**
  - **(1) Information Technology,**
  - **(2) Information Transaction Services,**
  - **(3) Knowledge Industries.**

- **For purposes of the investigation and, specifically, to determine whether there are significant differences in the use of information resources by various industry groups, the Manufacturing and Services Sectors have also been subdivided into what are seen as related industries, represented by decimal portions of the category codes.**
- **The starting point for analysis of the US data will be the 1996 US Input-Ouput matrix, the most recent official one. Then, the US Input-Output matrices for 1998 through 2004 (the most recent additions) will be analyzed.**
- **I assume that, within the time for this project, the next official US Input-Output Matrix will have been issued and I will then analyze it.**

Analysis of the Economic Structure

- **The approach to analysis of the structure of the economy will be illustrated by limiting the codes to the integer portion. The result in doing so is reduction of the total input-output matrix to the following, the values shown being those for the US in 1996, in billions of dollars.**

	Agri	Indust	Srvcs	Inform			
	Code 1.00	Code 2.00	Code 3.00	Code 4.00	Indust Sales	User Sales	Total Sales
Agriculture	$295	$33	$75	$19	$422	$371	$792
Industry	$112	$1,820	$196	$405	$2,533	$2,458	$4,990
Services	$54	$320	$107	$161	$642	$2,476	$3,118
Information	$62	$433	$417	$1,399	$2,311	$2,575	$4,886
Total Purchases	$523	$2,604	$795	$1,984			
Value Added	$271	$2,289	$2,264	$2,988			
Total Outgo	$794	$4,894	$3,059	$4,972	$5,907	$7,880	$13,786

- **(Please note that this limited display is simply to illustrate the process of analysis. The array of such analyses that will be done in the project will be far more detailed and extensive.)**

National Industry-Function Matrix

- **The National Industry-Function Matrix, unlike the National Input-Output Matrix, is highly speculative. It attempts to estimate the distribution of the national workforce by type of function within each industry. It is based upon a limited set of parameters that are applied to the reported data for distribution of the workforce among industries and among functions.**
- **To summarize, first, column totals (Functions) are derived from national economic accounts for distribution of the workforce by function, and row totals (Industries) are derived from national economic accounts for distribution of the workforce by type of industry. To illustrate, consider the relevant data for the US in 1999:**

- **Details about the National Industry-Function Matrix can be found in Hayes, Chapter 9, pages 233-240.**

	Category of Function					
Category of Organization	Non/Inform Functions	Information Functions				TOTAL
		Management	Support	Hardware	Substance	
Agriculture						
Subsistence						0.30
Industrial						2.70
Non-InfoIndustries						
Low Tech						65.30
High Tech						11.30
InfoIndustries						
Transactions						5.30
Hardware						3.30
Distribution						9.00
Academic						2.80
TOTALS	52.95	10.00	14.58	7.30	15.17	100.00

Note that these values are unknown, being hidden in the internal accounting of individual companies and not reported in any national statistics.

- **Then the following matrix of parameters is applied to row totals:**

Category of Organization	Non/Info Functions	Information Functions			
	Functions	Management	Support	Hardware	Substance
Agriculture					
Subsistence	0.90	0.10	0.00	0.00	0.00
Industrial	0.65	0.10	0.15	0.03	0.07
Non-InfoIndustries					
Low Info Use	0.65	0.10	0.15	0.03	0.07
High Info Use	0.25	0.10	0.15	0.15	0.35
InfoIndustries					
Transactions	0.25	0.10	0.15	0.15	0.35
Hardware	0.25	0.10	0.15	0.15	0.35
Distribution	0.25	0.10	0.15	0.15	0.35
Academic	0.25	0.10	0.15	0.15	0.35

- **Of course, the values in the matrix of parameters represent the current defaults. The appropriate values best to represent each country during each year may well change, and the assessment of them is part of the project.**

Application of the matrix of parameters to the source data for row and column totals results in the following distribution:

	Category of Function					
Category of Organization	Non/ Information	Information Functions				
	Functions	Management	Support	Hardware	Substance	TOTAL
Agriculture						
Subsistence	0.27	0.03	0.00	0.00	0.00	0.30
Industrial	1.76	0.27	0.41	0.08	0.19	2.70
Non-InfoIndustries						
Low Tech	42.45	6.53	9.80	1.96	4.57	65.30
High Tech	2.83	1.13	1.70	1.70	3.96	11.30
InforIndustries						
Transactions	1.33	0.53	0.80	0.80	1.86	5.30
Hardware	0.83	0.33	0.50	0.50	1.16	3.30
Distribution	2.25	0.90	1.35	1.35	3.15	9.00
Academic	0.70	0.28	0.42	0.42	0.98	2.80
TOTALS	52.40	10.00	14.96	6.80	15.86	100.00

- **Despite the limited number of parameters and the low precision in the related values, the column totals are remarkably close to those from the original data:**

Original	**52.95**	**10.00**	**14.58**	**7.301**	**5.17**	**100.00**
Model	**52.40**	**10.00**	**14.96**	**6.801**	**5.86**	**100.00**

Cobb-Douglas Production Model

- **The Cobb-Douglas Production Model is a classical production model, the simplest with the necessary properties in fact. It provides means for estimating the relative roles of capital and labor in the production of goods and services. Specifically, in log-linear form:**

$$\log(P) = \log(a) + b*\log(C) + c*\log(L)$$

where P is the production of goods and/or services, C is the capital investment cost, and L is the labor cost. The coefficients a, b, and c then are determined based on fitting available data (usually by a regression analysis).

- **Typically, c = 1 – b or very nearly so, and in such cases one might use the alternative form:**

$$\log(P/L) = \log(a) + b*\log(C/L)$$

which states that the production per unit of labor is a function of the capital investment per unit of labor.

Statistical Models

- **Clearly, the usual array of statistical models can also be brought to bear and doubtless will be, to varying degrees.**

Sources of Data

- **There are two primary foci for sources of data:**
  - **(1) library related data and**
  - **(2) national economy related data.**

Library Related Data

- **Data related to academic and public libraries in the US are available from the National Center for Educational Statistics (NCES), specifically from the IPEDS files. They are also, independently, available from the Association of Research Libraries and the Association of College and Research Libraries. Data for special (industrial) libraries are very difficult to obtain.**
- **Data related to academic and public libraries in the UK will be obtained from LISU at Loughborough University. A primary added source is SCONUL. Again data for special libraries are not available, but LISU plans, as part of their work on this project, to survey a major group of UK corporations.**
- **Data related to academic and public libraries in Croatia will be obtained from the National and University Library of Croatia, in Zagreb and, probably, from other sources.**

National Economy Related Data

- **The Bureau of Economic Analysis (BEA) is the crucial agency in the US for economic data in general and for the Input-Output Matrices in particular.**
- **The Office for National Statistics is the comparable agency for the UK.**
- **The Input-Output Matrix for the US and for the UK will be the primary source of data for each of those two national economies. These are each readily available online from the respective national economic analysis agencies, both for the established data file (which for the US is for 1996) and for the annual updates since then.**
- **Beyond the input-output matrix, there are other standard statistical reports that provide important economic data, such as *Statistical Abstract of the United States* and a similar publication for the UK.**

- **The Croatian Bureau of Statistics is the source for comparable data about Croatia. It publishes an annual *Statistical Yearbook* that is exceptionally valuable.**
- **The Input-Output Matrix for Croatia is problematic.**
  - **There was an official one for 1987, but that would be outdated.**
  - **There is a surrogate available from a report to the National Bank of Croatia, and that has been made available to me by Glenn Harrison, one of the co-authors of the relevant report.**
  - **There is an Experimental Input-Output Matrix created for 1997 data by Maja Gorjan Bregeš of the Croatian Bureau of Statistics, National Accounts, and she has given me permission to use it. Frankly, it really is an excellent piece of work and holds together remarkably well. She is to be congratulated.**
- **The Economics Institute of the University of Zagreb has been of great help in providing access to those responsible for compiling the current version of the matrix for Croatia (and that led to my meeting with Maja Gorjan Bregeš).**

..\..\Croatia Input-Output 1997 Experiment.xls

The Process to Date

- **I will now illustrate this process, using data about the United States (from the 1996 Input-Output Matrix and *Statistical Abstracts*) and data about Croatia (from the *Statistical Yearbook 2005* of the Croatian Bureau of Statistics, and the *Experimental Croatian Input-Output Matrix for 1997* of Maja Gorjan Bregeš, again, with her permission).**
- **Beyond that, I will also provide some further comments and conjectures about the results from Croatia, because they represent my initial guesses based on current statistics that I have been able to obtain about Croatian libraries and economy.**

U.S. Industry-Function Structure

- **The source data for the rows and columns in the Industry-Function Matrix model are from the U.S. *Statistical Abstract* tables for distribution of the U.S. workforce by categories of industry and of staff. The following is the result of application of the Industry-Function Model to those data:**

Type of Industry	Non-Info Staff	Management Staff	Support Staff	Hardware Staff	Knowledge Staff	Total %	Total Absolute Thousands
Agriculture	1.32	0.20	0.27	0.05	0.13	1.64	1,636
Lo Info Use	34.22	5.49	9.10	1.82	4.24	54.87	54,871
Hi Info Use	3.74	2.06	3.41	3.41	7.96	20.58	20,584
Hardware	0.72	0.36	0.60	0.55	1.41	3.65	3,647
Transaction	1.16	0.59	0.88	0.97	2.27	5.86	5,857
Knowledge	2.17	0.99	1.65	1.65	3.48	9.95	9,946
Academic	0.68	0.31	0.51	0.51	1.08	3.09	3,094
Total	44.03	10.00	16.42	8.97	20.57	100.00	100,000

Croatia Industry-Function Structure

- **I am now going to apply the same Industry-Function Model to data about Croatia. I am going to use data from the Croatia *Statistical Yearbook 2005* for the rows and columns that are the source data for that model.**

Croatian Distributions of Workforce 1

Table 6.19 Distribution of Workforce by Industry		
Industry	%	Assignment
Agriculture. hunting and forestry	16.50	1.0 Agriculture
Fishing	0.30	1.0 Agriculture
Mining and quarrying	0.80	1.0 Lo Info Use
Manufacturing	19.70	0.9 Lo Info Use 0.1 Info Tech
Electricity. gas and water supply	1.60	1.0 Lo Info Use
Construction	8.10	1.0 Lo Info Use
Wholesale and retail trade	13.90	1.0 Hi Info Use
Hotels and restaurants	5.40	1.0 Hi Info Use
Transport. storage and communication	6.40	0.7 Lo Info Use 0.3 Transaction
Financial intermediation	2.20	1.0 Transaction
Real estate. renting business activities	4.10	1.0 Transaction
Public administration and defence	6.40	0.75 Lo Info Use 0.25 Transaction
Education	5.30	1.0 Knowledge
Health and social work	5.60	1.0 Knowledge
Other service activities	3.30	1.0 Lo Info Use
Private households with employed	0.30	1.0 Lo Info Use
Total	100.00	

- The Croatian workforce by category of industry, Table 6-19 of *Statistical Yearbook*, is at the left.
- The third column shows assignments made for application of the Industry-Function Model. They are mostly guesses. At this stage, I must make such guesses (as shown in this display and in the next).
- However, the assignment of 0.10 for Info Tech in Manufacturing is based on the Input-Output Matrix. “Office Machines, Computers”, “Commun’tion Equipment”, and “Medical and Precision Equipment” totaled 7,630 million kuna out of the gross total of 338,327 million kuna, or about 2% of the total. Thus, they are about 10% of manufacturing.
- Similarly, Post and Telecom services totaled 7,308 kuna, again about 2% of the national total. Thus they are about 30% of Transportation and Communication.

Croatian Distributions of Workforce 2

Table 6-20 Employment by Work Category, 2004		
Work Category	%	Assignment
Legislators, senior officials, managers	4.70	1.0 Management
Professionals	9.20	0.7 Management 0.3 Information
Technicians and associate professionals	14.00	1.0 Information
Clerks	11.10	1.0 Clerical
Service workers, and shop sales workers	13.80	0.7 Manual 0.3 Clerical
Skilled Agriculture and Fishery Workers	14.90	0.7 Manual 0.2 Clerical 0.1 Information
Craft and related trades wo	13.20	0.7 Manual 0.3 Information
Plant and machine operators and assemblers	10.70	1.0 Manual
Elementary occupations	7.70	1.0 Manual
Armed forces	0.70	1.0 Manual
Total	100.00	

- Croatian distribution of workforce by category of function from Table 6-20 of the *Statistical Yearbook* is shown in the table to the left.
- The third column shows assignments made for use of the Industry-Function Model.

Croatia Industry-Function Structure

- **The following is the result of applying the Industry-Function Model to those data, using existing default values for the parameters in the model.**

Type of Industry	Non-Info Staff	Management Staff	Support Staff	Hardware Staff	Substantative Staff	Total	Total Absolute thousands
Agriculture	10.92	1.68	2.52	0.50	1.18	16.80	269
Non-InfoIndustries							
Low Info Use	27.55	4.24	6.36	1.27	2.97	42.39	678
High Info Use	4.83	1.93	2.90	2.90	6.76	19.30	309
InfoIndustries							
Hardware	0.49	0.20	0.30	0.30	0.69	1.97	32
Transactions	2.14	0.85	1.28	1.28	2.99	8.54	137
Distribution	2.08	0.83	1.25	1.25	2.91	8.30	133
Academic	0.65	0.26	0.39	0.39	0.91	2.60	42
Total	48.65	9.99	14.99	7.88	18.39	99.90	1,598

- **The row totals are essentially identical with those for the actual distribution by industry. The column totals compare as follows to the distribution by function:**

	Manual	Manage	Clerical	Information		Total
Model	48.65	9.99	14.99	7.88	18.39	99.90
Table 6-20	47.59	10.86	15.24		26.31	100.00

Purchases of Published Information

- **I am now going to focus my attention on Publishing and Distribution of Information.**
- **In the U.S. national accounts and Input-Output Matrix for 1996, those industries are included in SIC codes 26A and 26B, for print publishing, and 67, for radio and television.**
- **But, to understand the economics of information distribution, to those we must add SIC code 73D, advertising.**

- **The following data, from the 1996 Input-Output Matrix, shows why this is necessary:**

SIC	Industry	Income	Outgo	Net
26A	Print newspapers and periodicals	22485	64842	-42358
26B	Other print publishing	95247	132108	-36861
67	Radio & Television	4487	39488	-35001
73D	Advertising	175210	39066	136143
	Total	297429	275504	21923

- **Today, we should add the Internet and, more generally, electronic publishing to this picture. Unfortunately, though, the data for representing the advertising income, the direct income, and the outgo for Internet and electronic publishing industries simply are not yet available. When I examine information functions in libraries, though, there are some data available for their purchases of electronic books and journals, accessed primarily through the Internet.**

Relative Magnitude of Publishing

- **United States**
  - **Sales by the two categories of publishing and by the portion of advertising potentially attributable to publishing totaled $207,000 Million. That is about 1% of the total of $21,602,634 million.**
- **Croatia**
  - **The data implies that publishing is about 1.6%. First, the total sales of Paper products and Publishing was 8.1% of the total GNP and Publishing appears to be about 1/5 of that total. Hence, 1.6%. Second, the 1997 Experimental Input-Output Matrix shows total sales of Publishing at 2,254 Million Kuna out of a Total of 144,180 Million Kuna, or 1.6% of the total.**

U.S. Academic Library Data

- **The data for the most current ARL statistics, using the totals for all ARL libraries, are shown in the following display.**
- **The first two columns show the total data for the populations representing the workloads: materials and users. The next two columns, the workloads on users services and the costs for staff. The final two columns, the staff and the other associated budgets.**

ARL Data, the 113 Major Universities

VOLSADG	9,848,884	GRPPRES	107,798	PRFSTF	10,503
CURRSER	3,808,845	PRESPTCP	1,661,958	NPRFSTF	17,103
ILLTOT	4,423,582	REFTRANS	13,395,749	STUDAST	7,427
ILBTOT	2,988,730	INITCIRC	41,873,133	TOTSTF	27,606
		TOTCIRC	77,529,359	TOTSTFX	35,033
TOTSTU	2,528,613				
GRADSTU	547,886	SALPRF	562,726,581	EXPLM	984,519,056
PHDAWD	30,135	SALNPRF	496,470,435	EXPBND	24,041,238
PHDFLD	6,512	SALSTUD	99,779,796	OPEXP	314,136,595
FAC	166,378	TOTSAL	1,158,976,814	TOTEXP	2,481,460,950

- **First, I apply LPM to the workloads, using the existing default values throughout.**
  - **LPM Croatia 1-US ARL Total.xls**
- **Results for workloads are close enough for the moment.**
- **The staff are divided 9,000 in reader services, 13,000 in technical services, 3,400 in G&A**
- **It is the ratios of reader services staff to Faculty and of technical services staff to total materials budget that I am conjecturing will provide the basis for an extended assessment. So:**
  - **9,000/166 = 54 per 1000 Faculty members**
  - **13,000/985 = 13 per million dollars**
- **The total of 25,400 is 15% of the total faculty of 166,378.**
- **The materials budget is about $6,000 per faculty member.**

Workloads in Industry: United States

Type of Industry	Knowledge Staff	Total Absolute
		Thousands
Agricultur	0.13	127
Lo Info Use	4.24	4,245
Hi Info Use	7.96	7,962
Hardware	1.41	1,411
Transactio	2.27	2,266
Knowledge	3.48	3,481
Academic	1.08	1,083
Total	20.57	20,574

- The table to the left shows the results from application of the Industry-Function-Structure Model to U.S. Data.
- Total purchases by industry of materials was $106,000 million.
- So the reader services workload is 20.57 million and the technical services workload is $106,000 million
  - 54*20,570 = 1.11 million
  - 13*106,000 = 1.38 million
  - G&A would then add 0.38 million
- So, tentatively, we are looking at 2.87 million, or 14% of the 20 million total Knowledge staff. That might be dedicated staff or it might be a portion of staff of individuals presumably doing other things.
- Purchases of published materials are about $5,000 per knowledge staff member.

Croatia Academic Data

Students	Teachers
150,304	13,251

Croatia Academic Library Data

	Total	National	University	Faculty	Institute
LIBRARIES	138	1	2	131	4
ACQUISITIONS					
Books	154,480	22,114	26,717	77,909	27,740
Journals	73,620	15,786	11,880	33,558	12,396
HOLDINGS (in 1000)					
Books	6,728	2,069	879	2,539	1,241
Journals	1,568	289	18	969	292
BORROWERS					
Registered Borrowers	207,395	15,616	10,786	172,415	8,578
Circulation	1,202,618	320,000	320,292	499,215	63,111
Uses of Materials	2,181,967	282,170	285,876	1,291,624	322,297
ILL					
National Requests	13,281	1,276	297	11,196	512
Int'l Lend Requests	671	272	11	375	13
Int'l Borrow Requests	7,010	2,838	489	3,487	196

	Total	National	University	Faculty	Institute
FINANCIAL (1000 kuna)					
Total	106,207	55,363	10,486	28,703	11,655
Employee	60,229	25,774	9,290	16,004	9,161
Materials	29,511	5,192	10,388	11,692	2,239
Other	25,817	24,397	158	1,007	255
EMPLOYEES					
Total	760	306	76	277	101
Professional	552	193	53	239	67
Other	208	113	23	38	34
ACQUISITION MEANS					
Total (Books)	154,480	22,114	26,717	77,909	27,740
Purchase (Books)	65,543	4,171	13,114	46,416	1,842
Deposit (Books)	45,944	13,465	9,667	1,017	21,795
Exchange (Books)	3,428	601	1,431	1,355	41
Donate (Books)	33,742	3,877	2,505	23,299	4,061
Other (Books)	5,822			5,822	

- **From the Statistical Yearbook, 2005:**

	Total	National	University	Faculty	Institute
LIBRARIES	138	1	2	131	4
ACQUISITIONS					
Books	154,480	22,114	26,717	77,909	27,740
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Exchange (Books)	3,428	601	1,431	1,355	41
Donate (Books)	33,742	3,877	2,505	23,299	4,061
Other (Books)	5,822			5,822	

- **The acquisition was 154,000 books and 73,000 journals. The expenditures for materials was 26 million Kuna**
- **Again, first, I apply LPM to the workloads, using the existing default values throughout.**
  - **Croatia Libraries\LPM Croatia Academic Libraries.xls**
- **Results for service workloads really cannot be assessed, because there are no data about usage.**
- **The staff are divided 393 in reader services, 197 in technical services, 88 in G&A.**
- **It is the ratios of reader services staff (plus allocated G&A) to Faculty and of technical services staff (plus allocated G&A) to total materials budget that I am conjecturing will provide the basis for an extended assessment. So:**
  - **452/13.251 = 34 per 1000 Faculty members**
  - **226/5000000 = 45 per million dollars = 45 per 6 million kuna**
- **The total of 678 is 5% of the total faculty of 13,251.**
- **Purchases of printed materials are about $377 per faculty member.**

- ***As an aside, I must record that the numbers of books and journals acquired by the academic libraries of Croatia (meaning, essentially, by the University of Zagreb) are incredibly small, probably one-third to one-fourth of that for comparable institutions in the United States or the United Kingdom. It is a wonder that the faculty and students in Croatia keep up with world-wide research in their fields. But they appear to do so, and deserve credit!***
- ***As a result, though, the library staff involved in technical services is also incredibly small.***
- ***Beyond that, the number of staff providing services to users is only two-thirds that in the U.S. Again, the library staff is significantly less than is needed.***

Workloads in Industry: Croatia

Type of Industry	Substantative Staff percent	Substantative Staff thousands
Agriculture	1.18	19
Non-Info Industries		0
Low Info Use	2.97	47
High Info Use	6.76	108
Info Industries		
Hardware	0.69	11
Transactions	2.99	48
Distribution	2.91	46
Academic	0.91	15
Total	18.39	294

- Again, the table to the left shows the application of the Industry-Function Structure Model to Croatian data.
- While the prior picture, for the U.S., was well supported by the available statistics, this one for Croatia is much more difficult to support.

Workloads in Industry: Croatia

- **But there are some indicative data. First, let's look at employment in Research & Development. In Statistical Yearbook 2005, Table 27-1, they were presented as follows:**

					Persons in employment			
		Expenditures, thousand kuna			Full time		Part time	
	Legal entities	Total	Capital expend	Current expend	Total	Research	Total	Research
1,999	135	1,397,761	252,488	1,145,273	10,746	6,805	2,355	1,965
2,000	140	1,881,839	308,444	1,573,395	11,666	7,768	2,162	1,708
2,001	139	1,780,379	344,230	1,436,149	11,278	7,495	2,839	2,165
2,002	141	2,006,307	417,271	1,589,036	13,366	8,686	3,149	2,450
2,003	151	2,209,274	376,558	1,832,716	13,609	8,669	3,607	2,795

- **The distribution by sector was as follows:**

	Total Expend	Capital	Total	Salaries	Other costs
Total, All Sectors	2,209,274	376,558	1,832,716	1,047,665	785,051
Business Sector	864,196	139,929	724,267	311,134	413,133
Government Sector	485,336	63,124	422,212	264,106	158,106
Higher Educ. Sector	859,742	173,505	686,237	472,425	213,812

- **First, therefore, I will take the employment in R&D at about 15,000 (the full-time plus the part-time at 1/3 FTE)**
- **Second, from the Statistical Yearbook 2005, we have data about the number of top executives in business and government (legislators, senior officials and managers). In 2004, they represented about 5% of the workforce, or about 80,000 persons.**
- **Third, we have the estimated academic staff of 13,000.**
- **Fourth, from Tables 26-3 to 26-8, the total number of teachers is about 50,000.**
- **Thus, from these identifiable sources, we can account for perhaps 60% of the 294,000, and I expect that there are other sources (such as marketing staff) that can and will also be identified.**

- **I will now identify one more of them.**

Industrial Information Support Functions

- **Those data give us potential workloads from, say, 294,000 knowledge workers.**
- **How about the workload of materials?**
- **Here we do have data about publishing, from Experimental Input-Output Matrix. It showed total publishing sales of 6,282 million kuna, of which sales to final consumers were 2,417 and sales to industry were 3,865 million kuna, distributed as follows:**

A	B0	B1	B2	I1	I2	I3	Personal	Total
168	6	398	611	16	223	2443	2417	6282

- **Note the preponderance of use by the knowledge industries themselves!**

- **The figures, from a prior display, of 34 per 1000 faculty and 45 per 6 million kuna in purchases of materials (for Croatian academic libraries), would then imply:**
  - **(34/1000) *294,000 = 10,000 in support to the knowledge workers**
  - **(45/6 million kuna) *3,865 million kuna = 29,000 in processing**
  - **Total of 39,000.**
- **The total of about 39,000 are also part of the 294,000 knowledge workers, representing about 13% of them.**
- **Purchases of published materials is about $2,200 or 13,000 kuna per knowledge worker.**

- **Note that the effect of using the experience with Croatian academic libraries is quite similar to that from using it with U.S. academic libraries.**

Summary of Results

	U.S.	Croatia
Reader Services Staff per Faculty Member	54	34
Technical Services Staff per $1,000,000 Acquisitions	13	45
Total Library Staff per Faculty Member	15%	5%
Total Library Purchases per Faculty Member	$6,000	$377
Total Supporting Functions Staff per Knowledge Worker	14%	13%
Total Publishing Purchases per Knowledge Worker	$5,000	$2,200

- *For the moment, I must leave it at that.*

Commentary

- ***My objective in presenting these "results" is simply to illustrate a process, not to claim that answers have been found. My project has only just begun.***
- ***Beyond that, whether the "results" are meaningful or not, I realize that, from your perspective, a theoretical presentation is probably not what you wanted.***

- ***But, even so, my hope is that at the least I may have raised some questions in minds and perhaps introduced some theoretical models to you that you might later find of value in your own work.***

Commentary

- ***Leaving all of that aside, the facts are that the data for Croatia are exceptionally uncertain. Even the formally published statistics raise many questions.***
- ***Just to illustrate, not as a criticism of the statistics but to show some of the difficulties, there is a fascinating anomaly (the data being shown in the following display):***
  - ***Of the total Croatian population of 4.5 million,***
  - ***there are 3.0 million of ages between 15 and 65, but***
  - ***the identified employed and unemployed is only 2.1 million.***
  - ***Where are the other 900,000 persons?***
- ***For me, that is not an idle question, since I have no idea where they are and therefore of the effects they have on the economic structure and therefore on the models.***

- **Statistical Yearbook 2005, Tables 5-4 and 6-17**

Age	Men	Women	Total
15 – 19	152676	145930	
20 – 24	155739	149892	
25 – 29	148666	145831	
30 – 34	147920	147511	
35 – 39	158506	158767	
40 – 44	166499	166904	
45 – 49	168290	165286	
50 – 54	148224	151549	
55 – 59	108673	121102	
60 – 64	120667	141349	
Total 15 - 65	1475860	1494121	2969981
In Paid Employment	652000	541000	1193000
Self-employed persons	193000	126000	319000
Unpaid family workers	9000	37000	46000
Unemployed	329799	189721	519520
Total Employment Force	1183799	893721	2077520

Conclusion

- *In conclusion, I return to the issue with which I started, the issue that was raised by Peter Drucker and repeated most recently by Thomas H. Davenport.*
- *The question I raise to you, as "information managers" is, "Who should perform these library-like functions in your companies and agencies?"*
- *For the moment, let's suppose that the figure of 6% of the knowledge workforce in Croatia is indeed involved in the supporting functions. Who is performing them?*
- *As I said before and I now repeat, if they are performed by the managers who are doing strategic, long-range planning, by the engineers who are doing research and product development, by the marketing staff, the work will be inefficient and almost certainly less effective than if they are performed by professionals who understand those library-like functions.*

- ***They will be less efficient because there will almost certainly be duplication of efforts and because those managers, engineers, and market staff usually have larger salaries than information professionals. And, they definitely should be focusing their attention on their substantive responsibilities!***
- ***They will be less effective because those managers, engineers, and market staff do not have the necessary skills or, even if they do, ¸they do not have the continuing day to day use of them that maintains their effectiveness.***
- ***Beyond that, however, some library-like functions—preservation and archiving, in particular—are by their very nature ones that must be done by professionals. As I have said, in the United States the recent scandals have led to regulations that greatly increase the requirements for preservation of records, including those that relate to the use of external information. Those regulations by their very nature require information professionals to perform the functions in preservation and archiving.***
- ***Now, the situation in Croatia may, in that respect and in others, be different. But that is something you will need to assess, and I will try to do so as I proceed ahead.***

The End