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CORPORATE I/S STRUCTURE

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INTRODUCTION

The information systems (I/S) function has changed dramatically over the course of the past ten years. Corporations have undergone severe downsizing in an effort to remain competitive and profitable in the face of economic uncertainty.

The I/S function has not been immune from these downsizing activities. This is perhaps most evident when considering that the number of I/S employees has reduced substantially relative to other departments.

The provision of information services has evolved from a central, core I/S function towards a corporate level I/S department. Where originally, a central I/S function may have served the entire spectrum of business units, that central unit has now been supplemented by additional I/S departments located in the business units. There has also been expanded recourse to end-user computing and greater use of outsourcing services.

The I/S function has consolidated at the corporate level in an effort to centralize decision making and control. Data centers have also typically been centralized to achieve greater economies of scale. Systems development units have been decentralized to business unit and user department levels in order to promote responsiveness and greater effectiveness.

The extent to which firms pursued downsizing policies appears to have

bottomed out. Indeed, in some cases, firms have even begun to expand the scope of their I/S activities in anticipation of a general economic recovery.

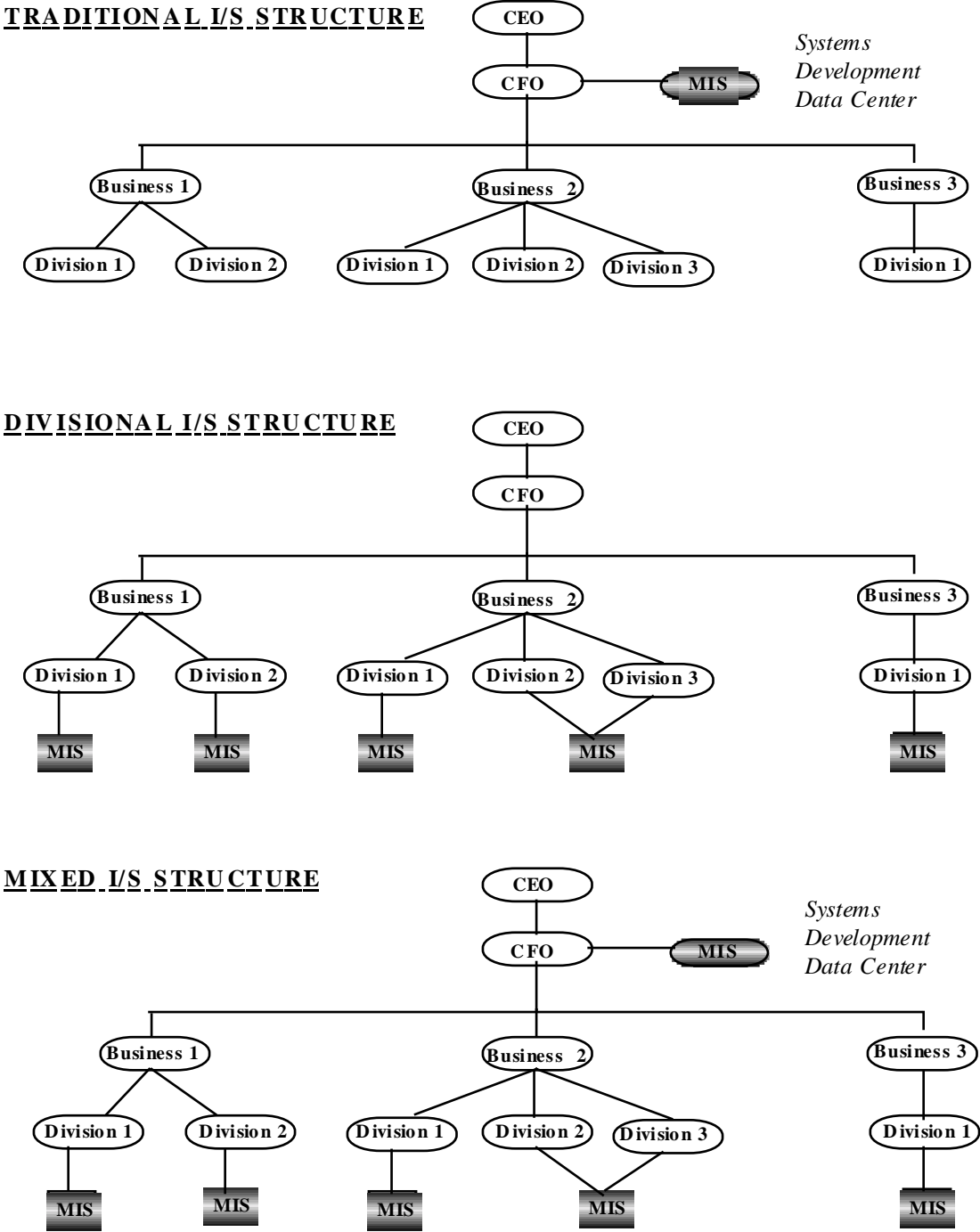
Depending on the direction of a firm's downsizing activities, its I/S structure may now be characterized in one of two possible ways; namely centralized or decentralized (Exhibit 1).

We refer to a centralized I/S structure as a "traditional" I/S organizational structure. There usually is a central I/S unit at the corporate level, supplemented by centrally administered systems development unit(s) and data center(s).

In contrast, a decentralized I/S organization structure is more akin to a "divisional" structure. Responsibility for systems development is transferred to the business units or end-users. Management and control of the I/S unit(s) and the data center(s) may still be retained at the corporate level or may also be transferred to the business units.

There is also a third I/S organizational form which we label "mixed". Based on our survey findings, we found that 20% of firms fall into this category. These firms are currently in the midst of a restructuring exercise that will ultimately push their I/S structure towards a centralized or decentralized organizational form. This compares with about 40% of firms who have adopted the traditional I/S organizational structure and 40% who have implemented the divisional form.

Exhibit 1. Generic Examples of I/S Organization Structure



Corporations have tended to retain management and control of their data centers and system development units in-house. The results of our survey indicate that 70% of all firms (55% of

manufacturing firms; 85% of service firms) have opted to retain absolute control of their data center(s) within the organization. Meanwhile, approximately 20% of all firms (20% of manufacturing

firms; 20% of service firms) have decided not to outsource any aspect of their new systems development activities. However, 60% of firms said that they have outsourced as much as 20% of their new systems development projects. This indicates that firms are more cautious about retaining complete control of their data internally than they are about outsourcing some aspects of their new systems development.

Methods and Data

Our general approach has been to examine the structure and format of the I/S organization over the past ten years for a sample of approximately 40 corporations. We then focus on the changing structures of the I/S organization over the period 1990 to 1994. The firms chosen as part of the Intercorporate Measurement Program (IMP) were from corporations that are considered to be at the leading-edge of I/S practice.

Exhibits A.1-A.5 at the end of this report show how our 40 IMP corporations compare with a larger sample of over 400 corporations² on five key features:

- Percent I/S budget of total revenues
- Percent I/S employees of total staff
- Total I/S expenses
- Total I/S staff
- Corporate productivity

Comparison of the patterns in these exhibits indicates two significant

²The larger sample of over 400 corporations was created by combining those reported in the *Computerworld Premier 100* and the *Information Week 500* from 1989-1993.

features of the two samples. The 40 IMP corporations are consistently higher on most values than the larger sample, which is consistent with their being at the leading-edge of I/S practice. However, the “patterns” in the exhibits are similar which indicates that the IMP sample can be generalized to the larger sample.

CORPORATE I/S STRUCTURE

The provision of information services has altered significantly since the mid 1980s. Where I/S services were initially provided by a centrally administered in-house department, that has now been supplemented by additional sources, such as subsidiary I/S departments in individual business units, end-user computing in individual departments and increased use of outsourcing firms.

Despite this trend, corporations have tended to retain the I/S function within the organization.. Approximately 86% of I/S services were provided by in-house departments in 1994. This compares with 88% in 1992 and 90% in 1990 (data not shown) and would appear to indicate a slight downward trend.

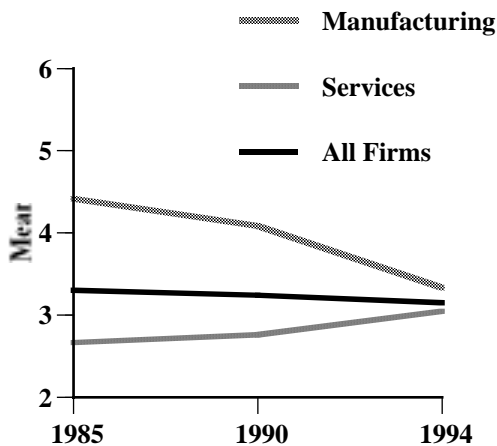
Centralization of I/S Units

Corporations have consolidated their I/S units within the last five years (1990-1994). Exhibit 2 examines the overall trend in the mean number of I/S units within corporations over a ten year period.

The general trend indicates that the mean number of I/S units has remained stable

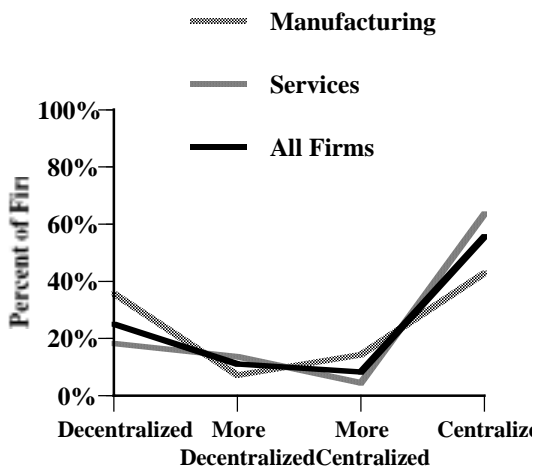
over this time period, despite the sometimes severe downsizing activities of the early 1990s. Our results, therefore, indicate that on average the mean number of I/S units within corporations has returned to its pre-downsizing level.

Exhibit 2. Mean Number of I/S Units Within Corporations, 1985-1994



Despite this stable trend, *corporations have moved to alter the internal structure of their I/S function over the last five years* (Exhibit 3)..

Exhibit 3. Reorganization of I/S Units (1990-1994)

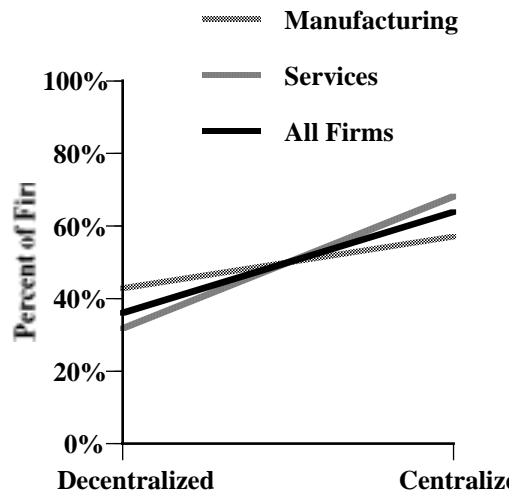


Approximately 60% of all firms defined their I/S unit(s) as centralized during this

entire period. This compares with only 20% who described their I/S unit(s) as decentralized during that time. Service firms were 50% more likely than manufacturing firms to remain centralized over the five year period.

The extent of the shift towards centralization of the I/S unit is even more apparent when we consider those firms that altered the structure of their I/S units during this five year period. By including these firms in our analysis, our survey indicates that approximately 70% of firms have centralized I/S unit(s) already or are moving their I/S unit(s) towards centralization (Exhibit 4). Of those firms that pursued a structural change of the I/S unit during the five year period, manufacturing firms tended to be three times more likely than service firms to move towards a centralized structure.

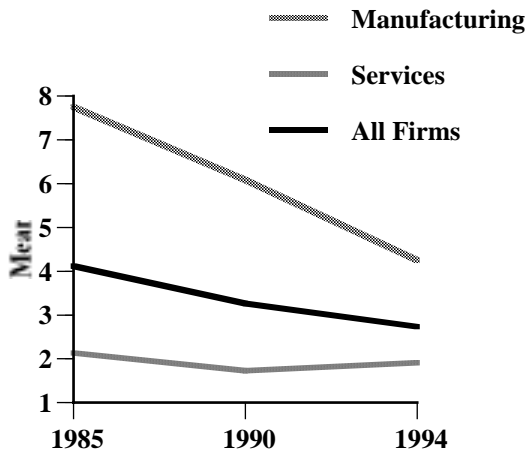
Exhibit 4. Structure of I/S Units (1990-1994)



Consolidation of Data Centers

Data centers are a vital component of a firm's I/S performance. They support the I/S operations of the firm by providing timely, consistent and economically priced computing services.

Exhibit 5. Mean Number of Data Centers Within Corporations, 1985-1994

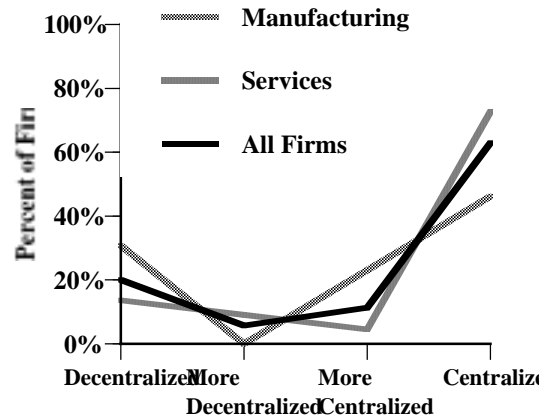


Prior to downsizing, data centers were typically located at the business unit level. At this level, it was felt that data centers were more responsive to individual business unit needs. However, during downsizing, data centers were consolidated and centralized at the corporate level. This represents an attempt by management to support the function of the data center while simultaneously reducing costs and promoting increased economies of scale.

The process of consolidation has given rise to a significant reduction in the mean number of data centers within corporations (Exhibit 5). Manufacturing firms were more likely to consolidate their data centers during this 10 year

period. Manufacturing firms reduced the number of their data centers by 30% compared to only 10% for service firms. The bulk of the downsizing activity took place during the period 1985-1990 when the mean number of data centers fell by an average of 20%.

Exhibit 6. Reorganization of Data Centers (1990-1994)



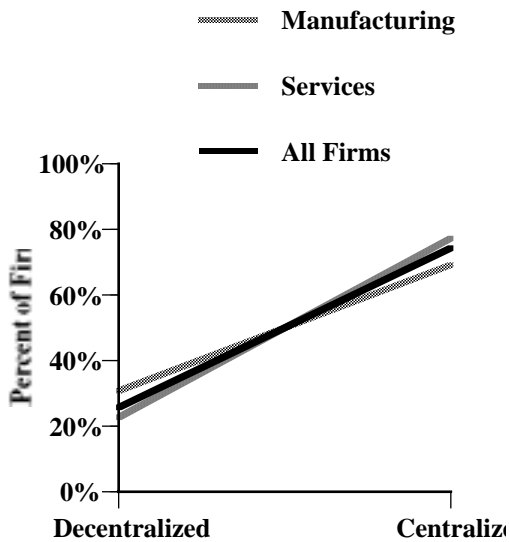
In addition to consolidating the number of data centers, corporations also sought to centralize the management and control of data centers at the corporate level. Approximately 60% of firms maintained centralized data centers continuously over the last five years (Exhibit 6). This compares with only 20% who administered decentralized data centers.

Approximately 70% of service firms maintained centralized data center operations during this five year period as compared with 40% of manufacturing firms.

However, 25% of manufacturing firms reported a shift towards centralizing their data centers during the period while only 5% of service firms noted a similar trend. The movement towards

centralization becomes even more evident when we include these firms in our analysis. In so doing, we note that 75% of all firms currently maintain or are restructuring to enable them to maintain centralized data centers (Exhibit 7).

Exhibit 7. Structure of Data Centers (1990-1994)



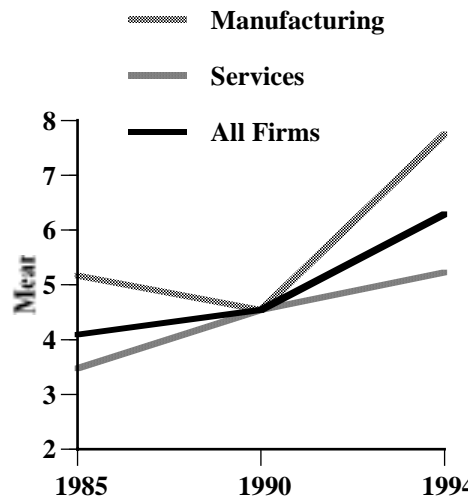
Decentralization of Systems Development Units

In contrast to the consolidation and centralization of the I/S unit(s) and data centers, there has been a significant increase in and decentralization of systems development units towards the business unit and end-user level. The motivation behind this shift was to promote increased responsiveness and effectiveness.

Both manufacturing and service firms increased the number of systems development units by approximately 50% over this ten year period (Exhibit 8). However, if we concentrate on the

last five years of our analysis (1990-1994), our survey finds that manufacturing firms increased their systems development units by 70% compared to only 15% for service firms.

Exhibit 8. Mean Number of Systems Development Units Within Corporations, 1985-1994

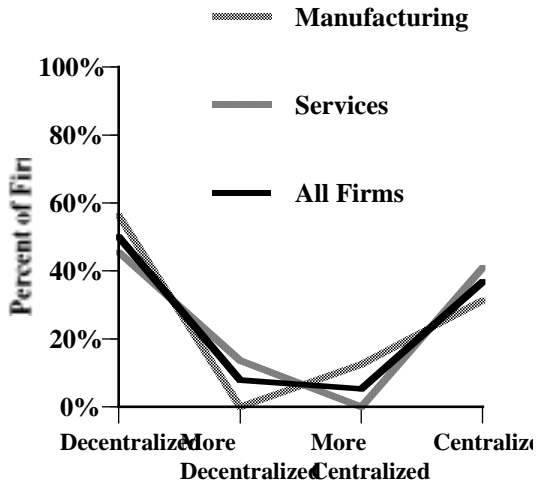


The structure of these systems development units has evolved to reflect the significant increase in their number over the past five years. However, the trend towards decentralization of systems development has not been as profound as the trends noted for the centralization of the I/S unit and data centers.

Fifty percent of the firms maintained decentralized systems development units over the entire five year period (Exhibit 9). This compares with 37% who indicated that they had operated a centralized systems development units over the same period. Of those firms that reorganized their systems development units during this time, 8%

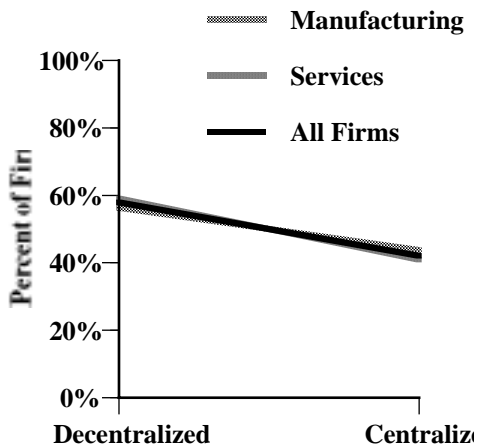
moved towards decentralization while 5% favored centralization.

Exhibit 9. Reorganization of System Development Units (1990-1994)



When we take these firms into our overall analysis, we find that firms are only twice as likely to favor a decentralized systems development unit than a centralized one (Exhibit 10).

Exhibit 10. Structure of Systems Development Units (1990-1994)



DISCUSSION

The I/S literature and previous studies suggested a trend towards centralizing the I/S unit, consolidating and centralizing the data center(s) and decentralizing systems development units. Our findings as given in this report support those trends.

Most firms would appear to have already achieved these stated objectives. We observed in a number of exhibits that firms have continually maintained centralized I/S units and data centers, and decentralized systems development units over the past five years. In instances where firms are continuing to restructure, they are doing so in a direction corresponding to the general trend. We further noted that both manufacturing and service firms are as likely to pursue a centralized structure as they are to pursue a decentralized structure.

However, our survey results are particularly useful in that they help to indicate the extent to which downsizing has stabilized across all firms. Many of the trends noted in this report are as a direct result of the downsizing activities adopted by firms in the early 1990s. Considering that many firms are now contemplating expanding their business units to pursue increased economic growth, it is interesting to predict how this will impact the I/S function.

If indeed firms are poised for expansion, then the fact that the I/S unit is centralized will assist in the firm's implementation of a corporate I/S policy to an increased range of business units.

The adoption of decentralized systems development units would also allow business units to implement I/S solutions faster and more effectively than if systems development was centralized.

Exhibit A.1 Total I/S Staff in Corporation, 1989-92

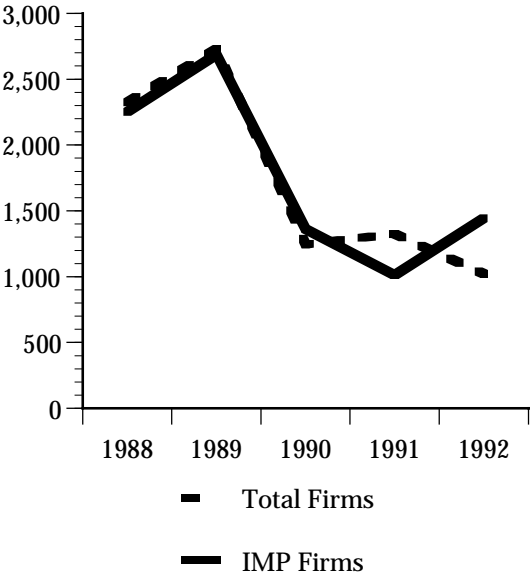


Exhibit A.3 Percent I/S Budget of Total Revenues, 1989-93

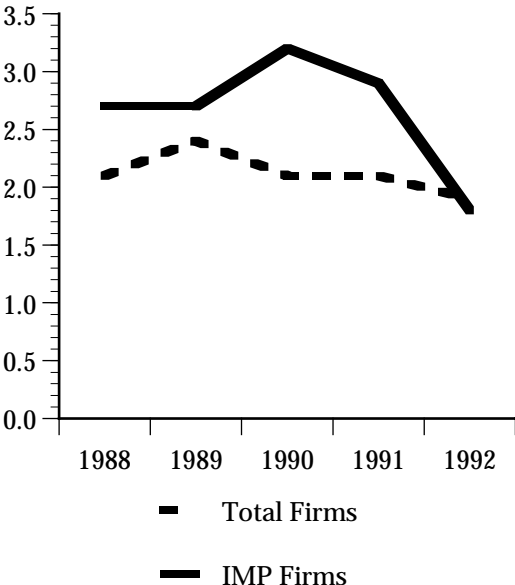


Exhibit A.2 Corporate I/S Expenses (in millions), 1989-93

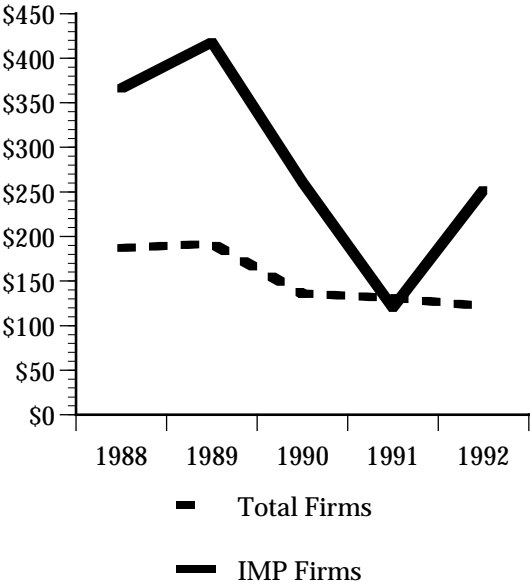


Exhibit A.4 Percent I/S Employees of All Employees in Corporation, 1989-93

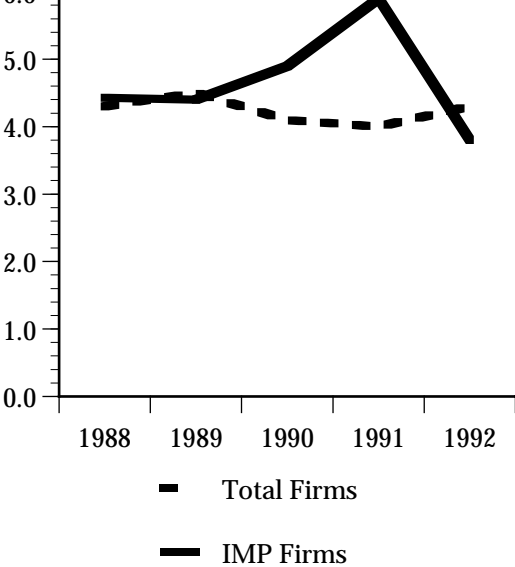
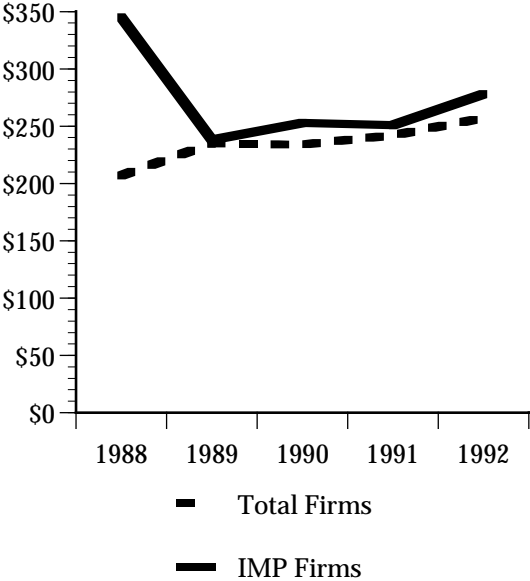


Exhibit A.5 Corporate Revenue Per Employee (in thousands), 1988-93



List of Participating Corporations

AT&T	Federal Express Corporation	Pennsylvania Power and Light Company
Aetna Life and Casualty	Fina	Pennzoil
Aid Association for Lutherans	First of America Bank Corp.	PepsiCo, Inc.
Airborne Freight Corporation	Florida Power & Light Co.	Petro-Canada, Inc.
Alliant Techsystems	Ford Motor Company	Phillips Petroleum Company
Amdahl Corporation	Furr's Inc.	Pillsbury Company
American Airlines, Inc.	GTE Service Corporation	Portland General Electric Co.
American Cyanamid Company	General American Life Insurance	Pratt & Whitney Canada Inc.
American Electric Power Service Corporation	General Dynamics	Principal Financial Group
American Greetings	General Electric Company	Progressive Corporation
American President Companies	Georgia-Pacific	Public Service Electric & Gas
Ameritech Services	Goodyear Tire and Rubber Co.	Reliance Electric Corporation
AMP	Grand Metropolitan	Resort Condominiums International
Amoco Corporation	Grumman Corporation	Rexnord Corporation
Apple Computer	Hallmark Cards, Inc.	Rockwell International
Ashland Oil, Inc.	Hoechst Celanese Corporation	Rohm and Haas Company
AST Research	J.M. Huber Corporation	Ryder Transport
Automobile Club of Southern California	Humana, Inc.	Sandia National Laboratories
Bank of America	IBM Corporation	Sandoz Pharmaceuticals Corp.
Barnett Banks, Inc.	IBM Canada, Ltd.	Scott Paper Company
Battelle Memorial Institute	Illinois Power Company	Sonat, Inc.
Bell Atlantic	Indiana Farm Bureau	Southern New England Telecommunications Corp.
BellSouth Telecommunications,	International Flavor & Fragrances	Sprint Cellular
Blue Cross Blue Shield of MI	Kroger	Storage Technology Corp.
Boeing	Land O'Lakes	Levi Strauss & Company
Borden, Inc.	Eli Lilly & Company	Sun Life Assurance Company of Canada
British Columbia Telephone	Lockheed Corporation	Sundstrand Corporation
Brooklyn Union Gas	London Life Insurance	Syntex Laboratories, Inc.
Burroughs Wellcome Company	Los Alamos National Lab	Taco Bell Corporation
Campbell Soup Company	Louisville Gas and Electric	Tennessee Valley Authority
The Church of Jesus Christ Latter-Day Saints	Mallinckrodt Medical, Inc.	Texas Utilities Services, Inc.
CIBA-GEIGY Corporation	McDonald's Corporation	Textron Inc.
CIGNA	Mercantile Bank N.A.	The Southern Company
CNA Insurance Companies	Miller Brewing Company	Transamerica Commercial Finance Group
Colgate-Palmolive Company	Montgomery Ward	Transamerica Insurance Group
Colonial Life & Accident Insurance Company	Mutual of New York	The Travelers Companies
CONOCO	Mutual of Omaha	UNUM Life Insurance Co.
Consolidated Edison Co.of NY	NCR Corporation	Ungermann-Bass, Inc.
Consolidated Freightways, Inc.	Nabisco Foods Group	Union Camp Corporation
Consumers Power Company	National Fuel Gas	Union Electric
Corning, Incorporated	Nationwide Mutual Insurance Company	Uniroyal Chemical Company
Del Monte Foods	NCS	Unisys Corporation
Duke Power Company	Nike Corporation	United Jersey Banks
Eastman Kodak Company	Northrop Corporation	The Upjohn Company
El Paso Natural Gas Company	Northwestern Mutual Life Insurance Company	USAIR
Elf Atochem North America	Occidental Petroleum Services	US West Technologies
Engelhard Corporation	Owens-Corning Fiberglas Corp.	Varian
ENSERCH Corporation	Pacific Bell	Western-Southern Life Insurance
Entergy Services	Pacific Bell Directory	
Exxon Corporation		

Westinghouse Energy Systems
Weyerhaeuser Company
Whirlpool
Xerox Corporation
Yellow Technology Services

About this Report

This special report is from “Performance Benchmarks for Information Systems in Corporations,” the full report of the 1994 survey of I/S. Corporations interested in obtaining a copy of the report, participating in the next survey, or joining the select group of corporations that are Sponsors of IMP are invited to contact:

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(617) 499-1389*

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About IMP

The Intercorporate Measurement Program (IMP) is a sponsored research program conducted by CSC Research and Advisory Services and the Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine. Its purpose is to further the state of the art of I/S performance measurement and to improve I/S performance in practice. IMP conducts annual surveys of management practice and I/S performance in corporations. It feeds back the knowledge gained to survey participants, to IMP sponsors, and to

CSC Consulting clients through publications, workshops, and client programs.

About the Authors

Kenneth L. Kraemer specializes in the management of computing, and is co-author of *Managing Information Systems* and ten other books on computers and information systems in organizations. **Vijay Gurbaxani** specializes in the economics of information systems and is the author of *Managing Information Systems Costs*, which deals with information systems budget planning and impact. **Debra Dunkle** specializes in survey research, data analysis and statistical modeling. **Nicholas P. Vitalari** specializes in business process reengineering, accelerated applications development, and change management. **Paul Tallon** is a Ph.D. student in the Graduate School of Management with a specialization on the management of information systems.

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