S.B. THESIS PROPOSAL: A CONJECTURE ABOUT COMPUTER DECENTRALIZATION

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Attached is my recently accepted Bachelor's thesis proposal

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Introduction

The question of how to match the computer-based information system to the organization has plagued management for years. Discussion of centralization versus decentralization of the computing facility has usually centered on advantages and disadvantages as a way of determining the "best" structure.[1] A more enlightening approach to this issue may be to discard the idea of a "best" way and instead search for the most natural form of computing. The conjecture is that decentralized computing is the most natural, i.e. there are strong forces in many organizations leading towards decentralization that have been held in check until now by technological and economic constraints.

The Significance of the Conjecture

If this conjecture is true, it is significant for two reasons. First, it will be increasingly difficult in the future for an organization to suppress strong forces from within, even if the philosophy of the organization favors centralization of the computing facility. The economic constraint is vanishing as computer hardware costs drop. The technological constraint--sharing of information among loosely coupled computers is not yet well understood--is still significant but it is not unrealistic to assume that it will be much less significant in the future. Second, these forces may result in local decisions that ignore, overlook or underestimate the present technological constraint. The result of these decisions could be difficulties in the future for organizational units desiring to share data or programs. Therefore some thought must be given now to overall system integration.

Forces Relevent to the Issue

It is apparent that some decentralization occurs at the initiative of lower-level managers, who opt for dedicating small computers rather than sharing the use of a large central system. The problem is to determine the forces that lead to these decisions and their significance to the conjecture that decentralized computing is more natural.

The following chart lists (rather cryptically) specific forces that have been suggested by preliminary study of the literature. These evident forces seem to fall into four categories: psychological, functional, economic or technological. The purpose of the thesis is to explore actual case studies to determine if solid evidence of these forces really exists.

The listing of forces is not meant to be exhaustive, consistent or convincing. The ideas are not all necessarily representative of the significant forces conjectured to be present. The list represents a starting point and its viability will be determined through the thesis research.

FORCES ENCOURAGING DECENTRALIZATION	FORCES DISCOURAGING DECENTRALIZATION

PSYCHOLOGICAL

1.	The desire for autonomy [3,5,7] -ability to control operations locally -no need to compromise with others -less frustration (no one else to blame)	1.	Blind faith in economies of scale [2,6]
2.	The power/status of your own computer	2.	Attitude of DP managers [9]
3.	Today's users are more sophisticated and more willing to take control	3.	Philosophy of organization
4.	Insures a greater degree of user acceptance because system is tailor made	4.	Lack of knowledge, which results in user fear
5.	Bad experiences with central system	5.	Requires change
		6.	Salesmen of large systems
		7.	Bad experiences with central system may be generalized to all computer systems

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FUNCTIONAL

1.	Specialized nature allows a better match of computer to user needs	1.	Information sharing and communication not as easily accomplished-less integration
2.	Ability to control operations locally [10] -time of availability -ability to regulate response time [2] -ability to absorb sudden peaks -less effect of one user on another -less service disruption for upgrades -fewer interference problems i.e., bugs that suddenly appear -better reliability and security		
3.	Less complexity to system [4] -shorter system development time		
4.	Smaller impact on the organization [9, 11]		

FORCES ENCOURAGING <u>DECENTRALIZATION</u>	FORCES DISCOURAGING <u>DECENTRALIZATION</u>

<u>ECONOMIC</u>

1. Diseconomies of scale [7,8,9]

2. Lower communication costs

3. Dedicated system can avoid waste by close matching of system and function

4. Requires fewer experts

5. Complexity of large systems has a cost

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1. Previous investment in hardware/software

2. Economies of scale [2,6]

3. Idle time of dedicated system implies some waste

<u>TECHNOLOGICAL</u>

1. New technology can be incorporated sooner because of short development time for small function

2. Proliferation of intelligent terminals may make local processing convenient (accelerator effects)

1. Networking to allow sharing not yet fully implementable

2. Software for small computers not on par with that for large computers

3. Problems of expanding small system

Plan of Research

A preliminary step in determining interesting and significant forces that encourage or discourage decentralization was a survey of the literature and some amount of intuition. The aim of the research is to determine which, if any, of these or additional forces exist and are significant to the conjecture that decentralized computing is more natural. The plan of research includes:

1. Collecting case studies that support or deny the conjecture

2. Analyzing the forces present in these case studies for their significance

3. Additional work that will aid in determining the significance of forces

   a) literature regarding the organizational impact of computers

   b) literature regarding personal computing, user-oriented systems, etc.

   c) background material on computer economics

   d) background material on changing technology

   e) discussions with professionals in the field for their opinions and possible inside case-studies

   f) discussions with other interested parties

The result of the research will be a thesis that is an analysis of the chart of forces that has been presented. As research proceeds the list of forces will be refined to reflect those forces that are significant in user decisions regarding decentralization.

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