



## Hardening soft accounting information: Games for planning organizational change

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### A B S T R A C T

This study provides theory and field evidence on the social process of hardening soft accounting information to make it persuasive for planning organizational change. Accounting information intended to support organizational change is often soft, that is, there is lack of interpersonal agreement about its quality. For example, employees can lack agreement about the quality of accounting information (e.g., activity-based costing) because the information is constructed from subjective information obtained from interviews and surveys. This information can contain unintentional errors as well as intentional distortions that are intended to avoid revealing embarrassing inefficiencies and/or to resist painful organizational change. We use concepts from applied game theory and social psychology to identify from the accounting literature four multi-person games that may be played to harden soft accounting information. These hardening games are characterized in terms of payoffs, players, the comparability of soft accounting information, and the rules of the games that are expected to emerge. We interpret the field evidence as indicating that the hardening games that emerge depend on who the players are and the comparability of their soft accounting information. In addition, we provide evidence on how the rules of the games that harden the information emerge from the players' social interactions. Finally, we provide evidence on how an organization learns by trial-and-error how to harden soft accounting information by changing the players and the comparability of the soft accounting information.

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### Introduction

A central question in the accounting literature is: What makes accounting information persuasive? For example, efforts to plan organizational change are likely to rely on accounting information from practices such as activity-based costing (ABC), benchmarking, and special studies, which are often constructed using subjective information from interviews and surveys without sufficient verification (auditing) (Chenhall & Euske, 2007; Kaplan & Anderson, 2007). Such information is likely not to be persuasive because it lacks objectivity and reliability and may contain unintentional errors. This enables those who supply the

information to intentionally distort their revelations of the information to their advantage when they wish to avoid revealing embarrassing inefficiencies and/or resist painful cost management actions (Argyris & Kaplan, 1994). In consequence, others may be skeptical about the quality or persuasiveness of the accounting information with which they are supplied and therefore they may not agree to accept and use it to plan organizational change.

This field study investigates the social process through which a group required to plan organizational change hardens soft accounting information, i.e., the group makes the information rise to an acceptable quality level so that group members agree that it is usable for planning organizational change. Based on social psychology theories, we view hardening as the process through which group members analyze and potentially change soft accounting

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information that is of ambiguous quality and come to agree that the information is hard enough to use (i.e., agree that the information is persuasive). Hardening is said to occur when group members who have different individual interpretations of the information come to agree on an interpretation that the quality of the information exceeds a minimally acceptable level. Thus for example, the members of a group harden soft accounting information by analyzing, evaluating, and potentially changing the information so that they and others are persuaded to agree to use the information to plan organizational change.

Based on accounting literature, applied game theory and social psychology, we model four patterns of players and comparability of soft accounting information that are expected to influence the emergence of rules of the games that constitute each hardening game. Like many games, hardening games are problematic due to the players' pay-offs. Players face a social dilemma between acting in an individually advantageous way (e.g., resisting the hardening of information for use in plans that are painful to them) versus acting in a way that is organizationally beneficial (e.g., hardening information so as to enable the development of persuasive plans for organizational change).

The focus of our study is on four hardening games that we identify from the accounting literature, which we call faith, power and politics, practical arguments, and statistics. These games are intended to increase the hardness of soft accounting information enough so that people agree that the information is persuasive and therefore useful for planning organizational change. Our study provides detailed evidence from a 2-year field study on how an organization learns by trial-and-error to harden soft accounting information by changing the players and the comparability of the soft accounting information. We interpret the field evidence as indicating that the hardening games that emerge depend on who the players are and the comparability of their soft accounting information. In addition, we provide evidence on the rules of the games that emerge when players have their social interactions to harden the information. Finally, we provide evidence on how an organization learns by trial-and-error how to harden soft accounting information by changing the players and the comparability of the soft accounting information.

The remainder of this study is organized as follows. The next section presents a literature analysis. The following sections present the research method and evidence from the field study. The final section has a discussion of the results, limitations of this study, and questions for research.

## Literature analysis

This section analyzes literature on organizational change and soft accounting information, soft, hard and hardening accounting information, comparability of accounting information and, finally, hardening games.

### *Organizational change and soft accounting information*

Organizational change is often conceptualized as a process that unfreezes, then changes and ultimately refreezes

an organization (Lewin, 1951). This study focuses on the part of the process immediately after unfreezing but before a plan for changing the organization has been implemented. Ambiguity is likely to be at its maximum at this early stage of organizational change (e.g., is change really necessary and, if so, how much change is needed, how to change, what is the quality of information available to plan the change) (Weick, 1995). Antecedents of organizational change include economic crises, failure to satisfy economic expectations, large-scale collaborative creativity, and regulatory and technological changes (Adler & Chen, 2011; Boland & Pondy, 1983; Chenhall & Euske, 2007; Chua & Degeling, 1993; Dent, 1991; Ezzamel & Bourn, 1990; Hopwood, 1987; Hopwood, 2009; Miller & O'Leary, 1994; Rowe, Birnberg, & Shields, 2008).

Our field study focuses on efforts to change an organization that are precipitated by an economic crisis. This context opens up "the possibilities for radically changing cost levels... [and as a result] a vibrant organization adjusting itself to an economic crisis is likely to be, at least temporarily, much more information intensive." (Hopwood, 2009, pp. 799–800) Increasing information intensity often involves the construction of accounting information that is soft. Management accounting practices such as ABC, benchmarking, and special studies that frequently produce soft information (Briers & Chua, 2001; Kaplan & Anderson, 2007; Miller & O'Leary, 1994; Rowe et al., 2008) can be used to plan organizational change (Boland & Pondy, 1983; Chenhall & Euske, 2007; Miller & O'Leary, 1994; Rowe et al., 2008). For example, soft accounting information collected for use in organizational change attempts to identify "work processes [that] were not standard across or within the studied segments... [In addition, the information came from] knowledge of the resources needed to accomplish specific activities [that] was based on the professional judgment of the local managers..." (Chenhall & Euske, 2007, p. 622, italics in the original).

### *Soft, hard and hardening accounting information*

In the context of planning organizational change, users of accounting information are likely to have concerns about the quality of the information. Accounting information used for planning organizational change is often based on interviews and surveys of individuals (e.g., local managers) who are likely to be affected by the organizational change. These individuals potentially have reasons to distort the subjective information they provide during interviews and in surveys used to construct the soft accounting information. For example, intentional distortions can be motivated by the desire to avoid embarrassment and/or to resist threatening organizational change, possibly associated with painful cost management actions such as large budget cuts (Argyris & Kaplan, 1994; Cooper & Hopper, 2007). In consequence, users of this information are unlikely to believe that the accounting information is persuasive or to agree to use it to plan organizational change until after it is hardened.

We assume a consensual theory of the truth that what people believe is hard or persuasive information depends on interpersonal agreement (social proof) that provides

confirmation by others that a particular interpretation of the information is sufficiently correct (Chaiken, Wood, & Eagly, 1996; Cialdini, 2001; Hardin & Higgins, 1996). From this social psychology perspective, “[s]hared reality functions to establish the reliability of an experience, just as repeated observation of a phenomenon gives it statistical reliability” (Hardin & Higgins, 1996, p. 36).

Thus, we view hardening as a social process of making information of ambiguous quality into information of acceptable quality. This increases the level of agreement among group members that the information is hard and, as a result, the hardened information can be useful as facts, information, and premises, for example, to plan organizational change (Hardin & Higgins, 1996; Walton, 2008; Weick, 1995; Weick, Sutcliffe, & Obstfeld, 2005). Social psychology literature refers to hardening as consensual legitimation (Heckscher, 1994, chap. 2), sensemaking (Weick, 1995; Weick et al., 2005), and social verification (Hardin & Higgins, 1996). Accounting literature investigates concepts that have objectives similar to hardening such as increasing consensus about and/or the persuasiveness of information. The accounting literature calls these concepts fabricating (Preston, Cooper, & Coombs, 1992), fact-building (Chua, 1995), producing truthful knowledge (Lambert & Pezet, 2010), purifying (Christensen & Skærbæk, 2010), and translation (Christensen & Skærbæk, 2010; Chua, 1995; Preston et al., 1992). These concepts differ, however, from hardening in terms of the social processes that are expected to increase consensus and/or persuasiveness.

We view hardening as a game that occurs early in the process of organizational change when people are coping with ambiguity and trying to make interpersonal sense of the information. Pentland and Carlile (1996, p. 284) characterize auditing in a similar way: they maintain that “As... games, audits embody a contest over the facts; until this contest is resolved, application of formal rules is impossible.”

#### *Comparability of accounting information*

Much social psychology literature is focused on social comparison theory that is limited to interpersonal comparisons. In contrast, following Hardin and Higgins (1996), this study adopts a broader notion of comparison that encompasses social as well as physical comparisons. Comparable accounting information enables people to identify similarities and differences that help them to reduce ambiguity about the information. For example, Hopwood (1987, p. 216) describes how constructing comparable accounting information enabled Wedgwood to make sense of his uneasiness when in “Comparing his financial accounts with his emergent costings, he found that the two did not agree.” This difference led Wedgwood to discover fraud.

Comparable information can be essential for making decisions and solving problems by facilitating analogy and metaphor, mapping situations onto other situations, sensemaking, translating, and linking intersubjective meanings (Gröjer, 2001; Hardin & Higgins, 1996; Hofstadter, 2000; Weick et al., 2005). The comparability of account-

ing information is a property of the information as a language with characteristics that include standardization, understandability of the language used to express the information, and the number of possible comparisons that can be made with the information (Boland & Pondy, 1983; Lavoie, 1987; Pondy, 1978). Standardization increases the comparability of measurements of similar (cost) objects by the same or different measurers (e.g., accountants, consultants). For example, an ABC dictionary provides consistency of cost language (e.g., categories, labels) and measures including activities, activity attributes, processes, and other cost objects (Kaplan & Cooper, 1998).

The comparability of accounting information also depends on the understandability of the language used to express the information, which can influence making intersubjective sense of the information (Hall, 2010; Lavoie, 1987; Rowe et al., 2008). For example, when accounting information is stated in plain language that all people understand (including people with little or no accounting knowledge), it enables them to identify what comparisons are possible for them to make with the information and they understand what the comparisons mean. In contrast, when information is expressed in technical language that only accountants or consultants understand (e.g., technical accounting or statistical jargon that is not understandable by other people), other people have difficulty identifying what comparisons are possible and what the comparisons mean. Finally, the comparability of accounting information also depends on the number of possible comparisons that can be made with the information. For example, organizations often rely on ad hoc information during periods of organizational change (Chenhall & Euske, 2007; Hopwood, 2009; Rowe et al., 2008; Simon, Guetzkow, Kozmetsky, & Tyndall, 1954), such as benchmarking information that allow only a few possible comparisons (e.g., comparisons of highly aggregated manufacturing processes in other organizations) (Miller & O’Leary, 1994).

#### *Hardening games*

Hardening games are intended to harden soft accounting information to enable people to reach agreement that the information is of sufficient quality and therefore persuasive enough, for example, to plan organizational change. These games emerge as simple rules when players begin to interact to assess the quality of the soft information, and the rules govern the players’ social interactions, which can potentially produce complex organizational change (Schelling, 1978; Selten & Warglien, 2007; Weick, 1995).

Like all games, hardening games have four components: information, payoffs, players, and rules (Brandenburger & Nalebuff, 1995; Sunder, 2002). The players can be accountants, consultants, and managers, and they can be players because they are chosen by central managers or they decide on their own to harden information. We assume that soft accounting information (e.g., costs reported in an ABC report from a consulting study) is information that is available to all players (i.e., people who harden soft information) and users of the information (e.g., people who plan organizational change). The rules of a game identify the

pattern of interactions between players that the players consider to be appropriate to harden the information. The games are identified from the accounting literature based on the assumption that players “interact in an endless variety of ways, but there are generic classes of interactions.” (Bowles, 2004, p. 35).

Based on social-relational framing, the hardening game that emerges is expected to depend on the players' interpretation of their social context (Fiske, 1992; Haslam, 2004; Rowe, 2004; Rowe et al., 2008; Tetlock & McGraw, 2005). This study investigates who the players are and the comparability of the soft accounting information they have to play with as two variables that influence the players' interpretation of their social context and thus the rules they assume are appropriate by which to reach agreement on the hardness of the information.

Payoffs in many games include costs each player directly incurs in contributing to the players' collective actions and benefits that are indirect to each player because they arise from their own and other players' actions (Bowles, 2004). Consistent with direct costs and indirect benefits, contributing to organizational change is costly to individuals (e.g., exerting effort to harden information, identifying where and by how much one's own budget can be cut) but collectively beneficial to their organization (e.g., enabling the organization to survive its economic crisis) (Chua & Degeling, 1993; Rowe, 2004; Rowe et al., 2008). Solving this social dilemma between the avoidance of individual costs and the production of organizational benefits often depends on facilitating trust and the formation of a coalition that has the critical mass needed to sustain socially desirable collective action (Schelling, 1978).

### Emergence of hardening games

Hardening games emerge when players begin to socially interact to assess the quality of soft accounting infor-

mation. How the players harden this information depends on their payoffs and the rules of the game that emerge during their social interactions.

We identify four hardening games based on our review of the accounting literature that differ in terms of players, comparability of soft accounting information, and rules of the games. These games are (what we call) faith, power and politics, practical arguments, and statistics. As previously stated, we expect that different patterns of players and comparability of soft accounting information will influence how the players interpret their social context, which in turn affects the rules of the game that emerge during the players' social interactions. Table 1 presents a summary of the patterns of players and information that are expected to induce the emergence of particular rules and thus hardening games.

### Faith game

Briers and Chua (2001, p. 268) link “faith in the wisdom of experts” with the transformation of “soft [ABC] data” into “hard facts.” The rules of the faith game focus on players' beliefs about the proper implementation of accounting practices instead of on hardening the accounting information per se. Accounting information is often accepted on faith that hard information will result. For example, when players believe they have expert accounting knowledge, they believe they choose appropriate accounting practices (e.g., ABC) and properly implement these practices as prescribed in practice-oriented literature (Briers & Chua, 2001; Christensen & Skærbæk, 2010; Chua, 1995). Thus, in a faith game if the players believe that appropriate accounting practices have been properly implemented, then they assume on faith that the information is hard.

A faith game is expected to depend on players having technical knowledge about the soft accounting information and thus usually the players will be accountants and/or consultants. In addition, low comparability of the soft accounting information (low standardization, technical

**Table 1**  
Hardening games.

Hardening games	Faith	Power and politics	Practical arguments	Statistics
Players	<ul style="list-style-type: none"> <li>Accountants and/or consultants</li> </ul>	<ul style="list-style-type: none"> <li>Powerful central managers</li> </ul>	<ul style="list-style-type: none"> <li>Committees and/or cross-functional teams</li> </ul>	<ul style="list-style-type: none"> <li>Accountants and/or consultants</li> </ul>
Comparability of soft accounting information	<ul style="list-style-type: none"> <li>Low</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> </ul>	<ul style="list-style-type: none"> <li>Medium</li> </ul>	<ul style="list-style-type: none"> <li>High</li> </ul>
<ul style="list-style-type: none"> <li>Standardization</li> <li>Language</li> <li>Number of possible comparisons</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> <li>Technical</li> <li>Few</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> <li>Technical</li> <li>Few</li> </ul>	<ul style="list-style-type: none"> <li>Medium</li> <li>Plain</li> <li>More than a few</li> </ul>	<ul style="list-style-type: none"> <li>High</li> <li>Technical</li> <li>Many</li> </ul>
Rules of the games	<ul style="list-style-type: none"> <li>Information is believed to be hard if appropriate accounting practices are properly implemented</li> </ul>	<ul style="list-style-type: none"> <li>Powerful managers use their authority to harden information based on their agendas</li> <li>Intentional distortion of information</li> </ul>	<ul style="list-style-type: none"> <li>Inclusive debate using practical reason and majority rule</li> <li>Elaboration on information to fill in gaps</li> <li>Player triangulation</li> <li>Interdependence between players and information</li> </ul>	<ul style="list-style-type: none"> <li>Statistical analysis</li> <li>Information triangulation</li> <li>Independence between players and information</li> </ul>

language, only a few possible comparisons) is expected to aid in creating a social context that is conducive to the emergence of a faith game because this information does not support comparative analysis that is assumed to be essential for other hardening games. Thus, faith is expected to be the game played by default when players are accountants and/or consultants and soft accounting information has low comparability.

#### *Power-and-politics game*

In a power-and-politics game, hardening soft accounting information is analogous to an “ammunition machine” for constructing evidence that enables “interested parties...to promote their own particular positions.” (Burchell, Clubb, Hopwood, Hughes, & Nahapiet, 1980, p. 15) Political struggles among people in power are common during periods of organizational change because there are high stakes and many possibilities for radically changing the distribution of resources within organizations (Burchell et al., 1980; Dent, 1991; Hopwood, 2009). The rules of this game include the use of power and authority to selectively determine that information is hard merely because it supports the powerful managers’ agendas (Child, Elbanna, & Rodrigues, 2010). Intentionally distorting (e.g., falsifying numbers) and deleting or ignoring information is also possible when it does not support the powerful managers’ agendas (Birnberg, Turopolec, & Young, 1983). This game is more effective when the players who are less powerful managers are not aware that they are being deceived (Cooper & Hopper, 2007). It can be difficult for players other than the powerful managers to observe the political behavior that drives this game (Child et al., 2010). The power-and-politics game achieves its intended objective when players are powerful managers (e.g., central managers) who persuade people who are less powerful (e.g., department managers) to accept and agree that the accounting information is hard based on their authority.

A power-and-politics hardening game is expected to depend on players who are powerful central managers and soft accounting information that has low comparability (low standardization, technical language, only a few possible comparisons). This information is likely to create a social context that is conducive to the emergence of a power-and-politics game because it gives the powerful central managers maximum opportunity to enact their political agendas.

#### *Practical-arguments game*

Practical arguments often are used to persuade people about the benefits of accounting practices and/or using accounting information (Argyris & Kaplan, 1994; Kaplan & Anderson, 2007; Lukka & Granlund, 2002). In playing this game, the players construct the facts or credible premises on which practical arguments are built (Craft, 1981; Dewatripont & Tirole, 2005; Weick, 1995). The rules of this game include a high level of participation and democratic decision making involving critical exchanges of ideas and information among the players with the goal of persuading at least a majority of them to agree on what information is hard (Toulmin, 2003; Jönsson & Lukka, 2007; Walton,

2008). All players have voices and votes, are open-minded but critical about the hardness of information, and decisions are made by majority rule. In this game, practical arguments become increasingly persuasive when they survive public challenges during debates, meet the required burden of proof (i.e., supplying evidence that information is hard), and win the tug-of-war between rival interpretations (Lavoie, 1987). Players rely on practical reasoning (or intelligent speculation) that depends on consistent information and arguments rather than on formal logic or more calculative statistical analyses (Toulmin, 2003; Jönsson & Lukka, 2007; Walton, 2008). Practical arguments are cumulative in that players elaborate on their initial information to make it less ambiguous and more complete by filling in gaps and incorporating information that is revealed and validated by players during their debates (Walton, 2008; Weick et al., 2005). By the rules of this game, players and information are interdependent, consistent with player triangulation.<sup>1</sup> For example, as people learn about the content of ABC models they often simplify activity labels and cost drivers (Kaplan & Cooper, 1998) and construct activity groups for summarizing the information (Wingren, 2005).

A practical-arguments game is expected to depend on players who have a competitive relationship, which is commonly enacted in organizations by the use of committees and/or cross-functional teams (Joyce, McGee, & Slocum, 1997; Walton, 2008). In addition, a medium degree of comparability of the soft accounting information (medium standardization, plain language, more than a few possible comparisons) is expected to create a social context that is conducive to the emergence of a practical-arguments game. Medium standardization of comparable accounting information enables a practical-arguments game by aiding people to analyze consistency among comparable information, which can increase their consensus that the information is hard (Chaiken et al., 1996; Cialdini, 2001; Walton, 2008). Also suggestive of a practical-arguments game, plain language facilitates critical discussions by including in debates a wide range of players who often have competing interests (Child et al., 2010). Finally, more than a few possible comparisons of accounting information (but not necessarily many comparisons<sup>2</sup>) are expected to foster the emergence of a practical-arguments game because the players in this game depend on comparisons to identify consistency as the basis for debating and agreeing that information is hard.

#### *Statistics game*

The statistics game is commonly associated with the accounting literature concerned with auditing financial accounting information (Ijiri, 1975; Power, 2003). Ijiri

<sup>1</sup> Player triangulation is similar to investigator triangulation (Birnberg, Shields, & Young, 1990).

<sup>2</sup> The burden of proof for establishing that information is hard is likely to be lower in a practical-arguments game than in a statistics game. For example, the level of consensus necessary for fostering social agreement that information is hard is often lower in a practical-arguments game (i.e., only a preponderance of evidence or greater than 0.50 probability) than in a statistics game (e.g., greater than or equal to 0.95 probability) (Hays, 1994; Walton, 2008).

**Table 2**

Time periods, dates, environment, comparability of accounting information, and players.

Dates	Period 1 1/90 to 4/91 (16 months)	Period 2 5/91 to 9/91 (5 months)	Period 3 10/91 to 1/92 (4 months)
Environment	– The economic crisis emerges before period 1 due to the end of the Cold War (the Berlin Wall fell in November 1989) and a cyclical downturn in aerospace industry sales	– The economic crisis continues	– The economic crisis continues
Comparability of accounting information	– Low. Accounting practices (benchmarking, ABC pilot, and special study) are constructed using information designed with low standardization, technical language that is not understandable by non-accountants, and the information allows only a few possible comparisons	– Medium. An ABC model and several special studies are constructed with accounting information designed with medium standardization, plain language understandable by non-accountants, and the information allows more than a few possible comparisons	– Medium. Accounting information from periods 1 and 2 is used in period 3
Players who participate in hardening	– Accountants and consultants from McKinsey and E&Y	– Accountants and consultants from Bain and D&T	– Cross-functional team members with many hours of debates spanning 12 meetings

(1975) argues that statistical analysis provides a mechanism for identifying hard accounting information. For example, Ijiri (1975, p. 37) asserts that “the degree of objectivity of a measurement can be represented by statistical measures of dispersion such as variance, standard deviation, or coefficient of variation.” Similarly, Christensen and Skærbæk (2010, p. 535) document consultants’ use of statistical analysis (e.g., random samples, statistical surveys) for “purifying” accounting changes and “converting values into undisputed facts.”<sup>3</sup> The rules of this game are characterized by information triangulation involving statistical analysis with many comparisons of accounting information and independence between the accounting information and the players. Independence is an important rule of the statistics game that enables players to harden information through independent replication or verification (Beecher-Monas, 2007; Kruskal, 1988). Independence means that players do not elaborate on or change the information during their analysis except for correcting errors or removing outliers (Hays, 1994).

A statistics game is expected to depend on players who are knowledgeable about both the information and statistical analysis for testing the information, and soft accounting information that has a high degree of comparability (high standardization, technical language, many possible comparisons). Players with the appropriate knowledge are likely to be accountants and/or consultants (Christensen & Skærbæk, 2010; Power, 2003). A high degree of comparability of accounting information is also expected to create a social context that is conducive to the emergence of a statistics game. High standardization of accounting information is essential in a statistics game because it enables cost objects to be compared by statistical analyses and information triangulation. This game typically relies on technical language, such as specialized accounting and statistical jargon (Christensen & Skærbæk, 2010; Ijiri,

1975; Lavoie, 1987). Finally, many possible comparisons (replications) of comparable information are necessary in order to have statistical analyses with sufficient power and reliability to discriminate between hard and soft information (Beecher-Monas, 2007; Hays, 1994).<sup>4</sup>

### Research method

The field evidence is from a 2-year field study utilizing participant observation of a large division (Convair) of a US aerospace company (General Dynamics) beginning 2 months after an economic crisis leads central managers to initiate the construction of accounting information intended to plan organizational change. The research design is based on temporal bracketing that divides the field study into time periods in which there are continuities of events within each period and discontinuities of events between periods (Langley, 1999). The temporal brackets are based on changes in terms of the players or the comparability of the soft accounting information. Changes in the players or accounting information are similar to a natural experiment. For example, the Controller stated “I was experimenting. I was not sure what the right level of implementation was.”<sup>5</sup> In particular, the comparability of the soft accounting information demarcates period 1 (low comparability due to low standardization, technical language, few possible comparisons) from periods 2 and 3 (medium comparability due to medium standardization, plain language, more than a few possible comparisons). In periods 1 and 2 the players are accountants and consultants and in period 3 the players are members of cross-functional teams. This research design allows us to compare differences in information holding the players constant (period 1 vs. period 2) and to compare differences in players holding the information constant (period 2 vs. period 3). Table 2

<sup>3</sup> In addition, statistical analysis can be used to test the degree to which comparable measures, measurers, or measurements converge (e.g., convergent validity, information triangulation, researcher triangulation, reliability analysis).

<sup>4</sup> For example, when a normal distribution is assumed, approximately 30 or more comparisons or replications are desirable for a powerful statistical test such as convergent validity (Hays, 1994).

<sup>5</sup> Interview with Controller (June 23, 1994).

presents the environment, the comparability of the soft accounting information, and the players who participate in hardening this information for each period. Table 3 provides a summary of the field evidence.

The field evidence was collected in real time<sup>6</sup> by the first two authors who were participant observers.<sup>7</sup> The two authors' participant observation is consistent with "modest" interventionist research (Jönsson & Lukka, 2007, p. 384). The first author was a full-time-employee participant observer and a student conducting research as part of an M.S. degree in accounting, thus he was an insider–outsider.<sup>8</sup> The second author was an unpaid observer during 10 months of the field study spanning periods 1 and 2. Their involvement includes participating in the implementation of many accounting changes with the intent of supporting the planning of an organizational change.

The field evidence collected in real-time during this 2-year field study is unusually extensive. It includes about 5000 pages of primarily proprietary documents from Convair. Extensive documentation was compiled because an important objective of Convair's central managers during the time of the field study was to "Document our trail; how we used...[accounting information that was constructed by accountants and/or consultants] to identify/support areas for improvement."<sup>9</sup> This trail includes detailed documents concerning accounting information (ABC, benchmarking, special studies), supporting interviews, surveys, and written correspondence, as well as chronologies of accounting information used during many attempts to harden the information. The accounting information involves a variety of players, detailed meeting minutes (compiled and distributed to all who participate in the meetings via e-mail), and many PowerPoint presentations about hardening the information.

<sup>6</sup> Real-time evidence collection is important because it is particularly well suited to providing information about the process by which players respond to unusual events such as hardening soft accounting information for planning organizational change (Cooper & Morgan, 2008).

<sup>7</sup> Multiple observers collected and interpreted the field data, which can increase the validity of the evidence through investigator triangulation (Birnberg et al., 1990). Participant observation has many advantages for collecting evidence that is not otherwise observable, including the ability to observe disagreement and resistance. It also has the advantage of gaining the trust of people in the organization and hence access to information that would otherwise be unavailable to outsiders (Young, 1999).

<sup>8</sup> The first author is an insider-outsider: he is an insider because he is an employee at Convair and an outsider because he is studying Convair as part of a program of academic research (Wallerstein, Duran, Minkler, & Foley, 2005). A year before the beginning of the field study, the first author began an academic study of changes in Convair's accounting system for credit towards a M.S. degree in Accounting. While continuing to work at Convair after the field study began, he observes many sets of accounting information that are constructed with the intent of using that information to plan organizational change. A researcher being an insider-outsider is desirable in interventionist research because researchers must "cross the border between the etic (outsider) and the emic (insider) perspectives" (Jönsson & Lukka, 2007, p. 373). The first author's insider-outsider role also reduces the demand-effects in which interviewees tell researchers what they believe the researchers want to hear (Young, 1999).

<sup>9</sup> "Minutes of meeting #5, Material Management process team," Convair interoffice memorandum (November 22, 1991).

## Field evidence

This section describes the Convair Division and its economic crisis and then presents field evidence for each time period.

### *The Convair Division*

The Convair Division of General Dynamics Corporation at the time of this field study has \$1B in sales from three product lines: one commercial jet aircraft structure line (subcontract production of the metal exterior of large wide-body passenger aircraft) and two military cruise missile lines.<sup>10</sup> Convair has 15 cost centers for operating functions (e.g., engineering, logistics, fabrication) and these functions have a total of about 300 departments. This field study begins 2 months after the fall of the Berlin Wall in November 1989, which symbolizes the end of the Cold War as "the nation stands down from the massive Reagan-era defense buildup local defense contractors privately are questioning whether they can survive the fallout of detente between the United States and the Soviet Union."<sup>11</sup> This event triggers an economic crisis at Convair. The crisis is that Convair expects to lose over 60% of its sales in three to 5 years if it does not implement an organizational change that significantly reduces its costs. For example, in period 1 McKinsey estimates that Convair needs to reduce its controllable costs by approximately 50% in order to maintain an acceptable ROI and survive the crisis.

A critical issue in limiting the potential for organizational change at Convair's is that 82% of its controllable costs are overhead, yet Convair's accounting system provides little visibility into these costs. For example, Convair's overhead cost pools are highly aggregated and structured to facilitate periodic aggregate-level reporting but not structured to provide the visibility believed necessary by McKinsey.

Players and/or users of the accounting information include accountants employed by Convair, consultants, central managers, and the members of committees and/or cross-functional teams. The consultants include Bain & Company (hereafter Bain), Deloitte & Touche (hereafter D&T), Ernst & Young (hereafter E&Y) and McKinsey & Company (hereafter McKinsey). Other consultants advise central managers and provide training but do not construct accounting information. Central managers are Convair's General Manager and committees composed of several division vice presidents who report to the General

<sup>10</sup> The Standard Cruise Missile Line produced "a lightweight winged aluminum missile which ... [would] cruise for more than 1500 nautical miles at very low altitudes to avoid radar detection and strike targets with pinpoint accuracy." (General Dynamics annual report (1975, p. 5) The Advanced Line produced a cruise missile that was designed to evade radar detection and to fly for a longer range. The Commercial Aircraft Structures Line manufactured the central body section of the MD-11 wide-body jet aircraft (the passenger compartment section).

<sup>11</sup> "Good times over, defense firms fear – Companies that grew in Reagan arms boom may melt down in Cold War thaw." *The San Diego Union* (January 29, 1990), p. 1.

**Table 3**  
Summary of the field evidence.

	Period 1	Period 2	Period 3
Participant observation	<ul style="list-style-type: none"> <li>– Attended presentation of cost management recommendations from McKinsey to central managers based on McKinsey's benchmarking information</li> <li>– Conducting interviews with 53 managers and supervisors from various functions to construct an ABC pilot study</li> <li>– Presented and attended four presentations of plans developed by accountants and consultants for solving the crisis that are presented to central managers</li> </ul>	<ul style="list-style-type: none"> <li>– Worked with central managers, accountants, and consultants to construct a division-wide ABC model</li> <li>– Conducted three-part structured interviews and surveys with approximately 60 managers and supervisors to construct the division-wide ABC model</li> <li>– Presented and attended presentations of special studies proposing organizational change intended to solve the economic crisis to central managers based on the ABC model information</li> </ul>	<ul style="list-style-type: none"> <li>– Participated in the cross-functional team involved in hardening the accounting information over 12 meetings</li> <li>– Observed and participated in the presentation of the cross-functional teams' plan for organizational change to solve the economic crisis</li> <li>– Conducted interviews with five central managers regarding the crisis and the construction of accounting information</li> </ul>
Unpaid external observer—second author	<ul style="list-style-type: none"> <li>– Met with accounting personnel, attended division meetings, and supervised an academic study of an ABC pilot by the first author</li> </ul>	<ul style="list-style-type: none"> <li>– Observed the construction of accounting information</li> </ul>	
Key documents and interviews <sup>a</sup>	<ul style="list-style-type: none"> <li>– Detailed notes from McKinsey's semi-structured interviews used to construct benchmarking information with 31 managers</li> <li>– Documentation of benchmarking practice presented to central managers by McKinsey</li> <li>– Documentation from interviews with managers used to construct ABC and special studies</li> <li>– Chronology of ABC pilot and special study information presented to central managers</li> </ul>	<ul style="list-style-type: none"> <li>– Documentation of the development of Bain's special study and presentation to central management</li> <li>– Documentation of the development, implementation, and presentations of the ABC model by accountants and D&amp;T</li> <li>– Special studies developed by accountants for organizational change for solving the crisis presented to central managers</li> <li>– Chronology of ABC-supported proposals for organizational change presented to central managers by accountants and consultants from D&amp;T</li> </ul>	<ul style="list-style-type: none"> <li>– Chronology of ABC, benchmarking, and special study information debated by members of a cross-functional team during 12 meetings including many custom reports requested by team members</li> <li>– Meeting minutes, including detail on comparisons made debate about hardness of the accounting information, player triangulation and elaboration on the information in the 12 meetings</li> <li>– Presentations made to central management steering committees by cross-functional team members documenting how they hardened the information and their proposals for organizational change</li> </ul>

<sup>a</sup> Each document was collected in real-time.

Manager.<sup>12</sup> Cross-functional teams are composed of mid-level functional managers or their representatives.

#### Period 1

Early in period 1, central managers with support from product-line management hire McKinsey to construct process benchmarking information for seven aggregate-level organizational processes that compares Convair's cost performance to world-class standards.

An impediment to this task, however, is that Convair's accounting does not provide information about processes. McKinsey conceptualizes organizational processes as each

spanning across many interdependent functions and departments at Convair, with similar processes in 24 organizations with world-class cost levels for these processes. McKinsey constructs these new cost objects at Convair and at the 24 organizations by relying heavily on surveys and interviews to obtain information from managers responsible for different parts of the processes.

At Convair McKinsey's participation with accountants in evaluating the benchmarking information involves:

"[D]eveloping the methodology and collecting the data necessary to determine process costs in a consistent way across divisions that would be comparable to commercial companies."<sup>13</sup>

<sup>12</sup> Although explicit economic incentives change for two of Convair's central managers (the General Manager and the Controller) (Dial & Murphy, 1994), they do not change appreciably for other users. Interview with Controller (June 23, 1994).

<sup>13</sup> "Perspectives and recommendations emerging from the benchmarking process: Review with Convair General Manager," internal Convair document prepared by McKinsey (June 14, 1990), p. 14.



This information is documented using technical language and the documentation focuses on describing accounting procedures for allocating and grouping costs from Convair's cost ledger and 31 interviews McKinsey conducts with Convair managers.<sup>14</sup> Accountants' and consultants' evaluation of the information is limited to agreement on procedures for constructing benchmarking measures but they do not attempt to evaluate the quality of the information after it is collected and processed.

The interviews highlight issues that limited previous cost management efforts at Convair. For example, the list of "Key Issues and Conclusions," containing direct quotes from the Convair interviews, are that:

"Soft disadvantages of initiatives for improving performance are not quantified."<sup>15</sup>

As a consequence of these and other concerns reported by McKinsey, seven Convair processes are constructed (e.g., aircraft manufacture, chemical processing, material management, missile assembly) and roughly standardized based on McKinsey's vague definitions in an effort to enable at least a low degree of comparability to the seven processes in the 24 organizations with world-class cost performance.<sup>16</sup> Roughly comparable information from the 24 organizations is based on a similar accounting method and interviews conducted by McKinsey at these organizations. McKinsey downplays the coarseness of the comparisons and concludes that the result is:

"process costs that accurately reflect the true cost of each process in order to make relevant commercial comparisons."<sup>17</sup>

In order to evaluate the standards used in the benchmarking comparisons, seven Convair central managers visit several of the 24 world-class organizations. They find subjectivity in McKinsey's reported information. For example, after investigating the electronics assembly and circuit card assembly operations at Fujitsu, they report:

"There were surprisingly few quantities that the Fujitsu hosts could talk about in any detail. . . . Quality performance is largely anecdotal since our hosts were unable to provide cost, scrap, repair, rework, or yield data to any significant accuracy."<sup>18</sup>

In addition to the world-class costs, subjectivity also exists in the estimates McKinsey elicits during interviews at Convair. For example, interviewees are asked to estimate how their functions' resources are divided among various processes. McKinsey does not attempt to investigate the quality of this benchmarking information.

In the 260-page notebook accompanying McKinsey's final presentation, McKinsey repeatedly suggests that Convair utilize a "cross-functional problem solving team"<sup>19</sup> to evaluate the quality of the accounting information:

"[We recommend] that Division senior management establish a cross-functional team to . . . Review the quality of the information provided by management systems and determine its appropriateness for supporting decision making. . . [and then] develop an implementation plan for identified improvements."<sup>20</sup>

This recommendation, however, is not implemented because:

"Cross-functional teams. . . will potentially change leadership. . . . Middle management will have a great deal of difficulty relinquishing decision making authority to multi-disciplinary teams."<sup>21</sup>

Central managers to whom the McKinsey benchmarking information is presented as the intended users of the information disagree about its credibility as the basis for organizational change. The Controller expresses frustration that several managers dispute the quality of the benchmarking information. This includes the Procurement Vice President whose function is a central part of the material management process that is found to perform especially poorly.<sup>22</sup> For example, the managers argue that McKinsey's benchmarking information relies on comparisons that are inappropriate:

"Some [managers] spent time arguing that the benchmarks were invalid [because they are] based on the auto industries inclusion in some of the benchmarks. The point was there were similar processes performed outside the defense industry much more efficiently."<sup>23</sup>

The Controller argues repeatedly that the benchmarks are valid information. However, the information is highly aggregated, which permits only one comparison for each of the seven benchmarks. In addition, the meaning of each benchmark and details about its construction are inaccessible to non-accountants because the construction is encoded in accounting jargon (e.g., many cost pools, various groups of cost categories, multiple allocations are all stated in technical accounting language). For example, an analyst from Operations gave up after a few days of attempting to understand the benchmarking information.

Despite disagreement about the validity of the benchmarking information, McKinsey attempts to use it as the basis for its general conclusions. McKinsey uses the benchmarking results to support the argument that:

"Significant opportunities exist to close the gap between [Convair's] current performance and world-class standards."<sup>24</sup>

"Division management can realistically expect a real 25 percent reduction in recurring costs in the first

<sup>14</sup> *ibid.*, pp. 1–260.

<sup>15</sup> *ibid.*, p. 29.

<sup>16</sup> *ibid.*, pp. 3, 10, 26–48.

<sup>17</sup> *ibid.*, p. 5.

<sup>18</sup> *ibid.*, p. 119.

<sup>19</sup> *ibid.*, p. 13.

<sup>20</sup> *ibid.*, p. 61.

<sup>21</sup> *ibid.*, p. 37.

<sup>22</sup> For example, McKinsey stated that "Convair's [procurement function] cost gap ranges from a disadvantage of 1.4–20 times the performance levels achieved by the best organizations." Interview with Controller (June 23, 1994), p. 33.

<sup>23</sup> Interview with Controller (June 23, 1994).

<sup>24</sup> "Perspectives and recommendations emerging from the benchmarking process: Review with Convair General Manager," internal Convair document prepared by McKinsey (June 14, 1990), p. 13.

2–3 years of closing the gap with world-class performance.”<sup>25</sup>

The quality of the benchmarking information and the conclusions based on this information continue to be disputed openly by central managers.<sup>26</sup> The benchmarking information is ultimately filed away because people do not agree to use it. Unfortunately, with the exception of the McKinsey benchmarking information, Convair’s accounting does not provide information about processes. As a result, accountants argue that Convair’s accounting is largely irrelevant to successful organizational change because it “Provides limited capability to eliminate non-productive overhead cost.”<sup>27</sup>

A new accounting department, Cost Management Initiatives, is created to learn about accounting information through trial-and-error and to select consultants as partners in the learning process. When this department is initially formed, there is ambiguity about:

“How do we ensure Division acceptance of a new accounting system? What will the impact of ABC be on the current work force?”<sup>28</sup>

Accountants from the Cost Management Initiatives department construct four ABC pilots within a few months. Interviews and surveys are the primary source of information for these pilots. For example, the aircraft product-line ABC pilot used “200 + interviews of [department] managers... to determine and validate [activity costs].”<sup>29</sup> In this instance “validate” means that several interviewees check to insure their inputs for constructing ABC pilots are correctly recorded in the associated information sets. Similarly, the focused-factory ABC pilot relies on 53 interviews.<sup>30</sup>

In addition, after McKinsey leaves, E&Y is hired to do a special study, also based on information obtained from interviews, which focuses on aggregate-level planning of the approximate location, magnitude, and timing of large process-level cost reductions at Convair. E&Y spends less than two weeks conducting interviews and developing a cursory plan for the organizational change.

As part of the ABC pilots and a special study, the accountants and E&Y construct sets of accounting information focusing on different organizational processes at Convair. This information is not comparable to the other accounting information. For example, E&Y’s special-accounting study contains only one measure of each cost object.<sup>31</sup> Thus, the

comparability of this information is low. Accountants make no effort to standardize the pilots to facilitate comparisons with the other pilots or the accounting information developed by McKinsey and E&Y.<sup>32</sup> In addition, the ABC pilots and the E&Y special study are constructed in large part using technical language (e.g., allocation bases, burden pools, cost codes) that are not likely to be understandable by non-accountants.

During period 1, other consultants in addition to McKinsey advocate using cross-functional teams to evaluate the accounting information and plan the organizational change needed to solve Convair’s crisis.<sup>33</sup> Despite these recommendations, no cross-functional teams are implemented.

Following the wide distribution of Convair’s total quality management plan announcing efforts to implement ABC and other accounting information, Convair’s Controller is concerned about the potential for an unfavorable audit of this information by the Defense Contract Audit Agency (DCAA). In recent years, the DCAA and other government audit agencies have “grown increasingly militant” paralleling congressional charges of “waste, fraud, and abuse” in the defense industry.<sup>34</sup> For example, in the last year “Convair was subject of 103 formal audits [of its accounting system] by various agencies.”<sup>35</sup> Audit standards applied to defense contractors require that “cost data” must be limited to “facts.”<sup>36</sup>

In response to a letter from the Controller, the DCAA acknowledges that in the current environment “To survive... many contractors realize they must change.”<sup>37</sup> The DCAA implies that, in the context of Convair’s crisis, implementation of ABC information based largely on subjective interviews may be acceptable:

“Because the proposed [ABC information] may represent a totally new method of cost allocation, the contractor may not be able to support the proposed [ABC information] with accumulated historical data. The contractor may have to support the proposed information with a combination of documentation... [including] employee interviews.”<sup>38</sup>

Furthermore, the DCAA’s response indicates that it has faith in Convair to validate its accounting information:

“The most effective audit approach is to monitor the contractor’s validation process and to coordinate with the contractor’s implementation team and internal auditors, thereby avoiding unnecessary duplication of effort and maximizing resource utilization.”<sup>39</sup>

<sup>25</sup> McKinsey (June 14, 1990), p. 54.

<sup>26</sup> Interview with Controller (June 23, 1994).

<sup>27</sup> “Activity-based accounting case: Imperial Valley pilot,” internal Convair document prepared by Convair (January 10, 1991), p. 13.

<sup>28</sup> “Activity-Based Cost Issues,” internal Convair document (March 12, 1991), p. 6.

<sup>29</sup> “ACMS pilot study—final presentation,” internal Convair document prepared by Convair (January 10, 1991), p. 3.

<sup>30</sup> “Activity-based accounting case: Imperial Valley pilot,” internal Convair document prepared by Convair (January 10, 1991), p. 18.

<sup>31</sup> For example, McKinsey “Excludes engineering component of cost as it is not directly comparable across industries.” “Perspectives and recommendations emerging from the benchmarking process: Review with Convair General Manager,” internal Convair document prepared by McKinsey (June 14, 1990), p. 15. However, this cost is included in Bain’s special study.

<sup>32</sup> Interview with Controller (June 23, 1994).

<sup>33</sup> “Why TQM now?” internal Convair document prepared by American Samurai Institute (August 15, 1990), p. 88. “Business process improvement: Integrated cost management,” internal Convair document prepared by E&Y (January 10, 1991), p. 46.

<sup>34</sup> Interview with Controller (June 23, 1994).

<sup>35</sup> “An overview of Convair accounting,” internal Convair document (May 16, 1990), p. 15.

<sup>36</sup> “Audit guidance on issues related to advanced cost management systems,” prepared by the Defense Contract Audit Agency, (January 22, 1991), p. 12.

<sup>37</sup> *ibid.*, p. 2.

<sup>38</sup> *ibid.*, p. 5.

<sup>39</sup> *ibid.*, p. 7.

After receiving this reassurance from the DCAA, no government (or internal) audits of this information occur.

Accountants and consultants, however, make no effort to evaluate the quality of the accounting information constructed in period 1. For example, no effort is devoted to statistically testing the information or to debating its credibility. E&Y does, however, attempt to use information from its special study as the basis for its aggregate-level plan to solve Convair's crisis. E&Y uses its special study to argue that Convair's annual costs can be reduced by \$155.5 M within 3.5 years by managing 25 cost drivers.<sup>40</sup> Several central managers, however, express their concerns about the unknown quality of E&Y's special study. For example, the study has only a single measure of each of its highly aggregated cost objects (processes) and therefore managers have little information by which to make comparisons in order to reduce their ambiguity about the quality of the study.

Like E&Y, the accountants also attempt to use the accounting information for planning organizational change without agreement that the underlying information is credible. For example, based on one ABC pilot, the accountants recommend reducing procurement costs by managing an important cost driver. Middle managers in procurement, however, resist efforts to use the number of purchase-order line-items as the means for reducing procurement function costs.

"Procurement personnel were preoccupied with job security and, therefore, attempted to subvert the system at every turn."<sup>41</sup>

Their argument is that purchase-orderline-items are used in different ways by product lines and therefore the information is not standardized to be comparable as the basis for cost management action.

Central managers choose not to implement any proposed plans based on the accounting information. Instead, the plans are placed "on hold"<sup>42</sup> by central managers who express concern that:

"There is limited capability to verify [the cost] savings."<sup>43</sup> "The accuracy and the appropriateness of all elements of the plans need to be improved."<sup>44</sup>

### Period 2

In period 2, more effort is made to construct accounting information that has more comparability. This effort centers on the construction of a division-wide ABC model

<sup>40</sup> "Integrated management system process value analysis report," internal Convair document prepared by external consultants from Ernst & Young, (May 7, 1990).

<sup>41</sup> Pattison, D. D. & C. Gavan-Arendt (1994). Activity-based costing: It doesn't work all the time, *Management Accounting*, 75, p. 61.

<sup>42</sup> "Advanced cost management system (ACMS) steering committee meeting #3," internal Convair document prepared by Convair and D&T (June 12, 1991), p. 93.

<sup>43</sup> "Advanced cost management system (ACMS) steering committee meeting #2," internal Convair document prepared by Convair and D&T (May 24, 1991), p. 110.

<sup>44</sup> "Activity-based accounting case: Imperial Valley pilot," internal Convair document prepared by Convair (January 10, 1991), p. 18.

(hereafter, ABC model) through a collaborative effort between accountants and D&T. The ABC model construction is led by the ABC model steering committee composed of five Convair central managers. In addition, Bain creates a special study that estimates the cost savings from completely outsourcing Convair's massive fabrication process which spans over 300,000 square feet of plant space. Accountants also create several special studies and ABC-supported proposals for organizational change during the period.

The ABC model steering committee members state that their goal for the ABC model is to "integrate all previous information [from period 1] into a single division cost model."<sup>45</sup> Accountants and D&T work with the ABC model steering committee to reach agreement on the definitions of Convair's processes. They also construct an ABC dictionary containing approximately 600 activities for standardizing the ABC model and reconciling it with information from the previous ABC pilots and the benchmarking and special studies that were constructed in period 1. Representatives from all of Convair's functions provide lists of activities for constructing the dictionary and they are also invited to comment on a preliminary version of the dictionary. Each activity in the ABC dictionary is defined in a sentence or two using plain language, devoid of the specialized acronyms and jargon associated with each of Convair's functional areas (e.g., the accounting function has many volumes of procedures filled with specialized terms and acronyms and other functions have volumes filled with their specialized jargon).

To support the construction of accounting information that has more comparability than the information constructed in period 1, the ABC model is designed to have several standardized measures of similar cost objects, which enables making comparisons (e.g., comparisons of activity costs across product lines and processes). In addition, the model is designed to support additional comparisons through user-constructed activity groups. Thus, this design encourages players and users to participate in elaborating on the information.

The ABC model is designed to reconcile McKinsey's benchmarking information and E&Y's special studies that are not directly comparable because they treated engineering activities differently. These activities are identified and explicitly incorporated into the ABC model so as to support a minimum of three, often four to seven, and occasionally a larger number of comparisons of accounting information.

The ABC model is constructed by relying on a:

"survey and interview technique that minimizes data acquisition cost...to recast [department] costs into [the costs of] processes"<sup>46</sup> and their value-adding and non-value adding activities.

During three rounds of surveys, hundreds of lower-level supervisors and managers are asked for their feedback to

<sup>45</sup> "Advanced cost management system (ACMS) steering committee meeting #2," internal Convair document prepared by Convair and D&T (May 24, 1991), p. 12.

<sup>46</sup> "Advanced cost management system (ACMS) steering committee meeting #2," internal Convair document prepared by Convair and D&T (May 24, 1991), p. 15.

identify misinterpretations. For example, interviewees are asked:

“Why did you choose each activity; i.e., what interpretation did you use for this department? If you needed to create new activities did you look through the entire activity [dictionary]?”<sup>47</sup>

In addition, the team of interviewers meets periodically while collecting interview and survey information to discuss concerns about how to increase the standardization of this ABC information. Accountants and D&T did recognize the subjectivity involved in gathering information from interviews and surveys in their written instructions to interviewees:

“Do the best job that you can to trace activities to costs, but do not agonize over the assignment. ...Use your best estimate. ... Call us if you have questions.”<sup>48</sup>

Finally, plain language is used to label and define the new cost objects (e.g., activities, cost drivers, non-value-added, processes) in the ABC dictionary and the ABC information to make it accessible to employees without accounting knowledge. In addition, costs are attributed to each cost object using an audit trail of documentation from three structured interviews and surveys that is both understandable and made available to non-accountants.

Consultants employed in period 2 again recommend using cross-functional teams to evaluate the accounting information. For example, D&T provide the following example from a prior consulting engagement to illustrate the value of cross-functional teams:

“[Initially] division ‘gridlock’ around decision-making brought the cost reduction process to a stall. ...[Then] an activity approach was utilized to perform a cost/benefit analysis. ...[and] a cross-functional team was created to assess the costs and benefits. ...[As a result] management identified a net savings of \$100,000. ...The cross-functional team’s scope has expanded. ...[and central managers] agreed with the team’s conclusions. ...Senior management believes that this methodology has lowered the risk of making significant decisions.”<sup>49</sup>

The controller summarizes the consulting studies to date as follows:

“All of the consultants said basically the same thing. ...To get larger potential savings required cross-functional organization...[which is] very difficult and dramatic.”<sup>50</sup>

Although the consultants emphasize the benefits of cross-functional teams for evaluating the accounting infor-

mation, these teams are a threat to some managers. Central managers therefore decide not to implement cross-functional teams.<sup>51</sup>

The accountants and D&T agree on “formal validation procedures [to] ensure integrity”. Fig. 1 shows the formal validation procedure in which accountants and D&T ask all the managers who had previously filled out surveys and participated in interviews for constructing the ABC model to “validate” their inputs to this model. The hope is that this procedure will be sufficient to make the information persuasive as the basis for the organizational change. During this validation procedure, accountants and D&T are simultaneously developing ABC-supported proposals for organizational change. The result of the validation is that almost all the managers quickly “validate” the information for their functions by checking three boxes on their response form without making any changes (only four managers out of approximately 300 make minor corrections to the reported ABC model information for their function).<sup>52</sup> In the ABC model steering committee meeting immediately following this validation procedure, D&T promises to “distribute and review [the ABC] model results—fully validated”.<sup>53</sup> In this meeting, however, steering committee members do not seem to believe that the information is “fully validated” because they ask accountants and D&T for additional validation.

In response to concerns expressed by steering committee members about the validity of the ABC model information, accountants and D&T spend a few hours attempting to analyze this information. For example, Convair’s three product lines’ costs in the ABC model are all found to be within two% of the costs reported by Convair’s accounting system.<sup>54</sup> Other comparisons and attempts to triangulate the information, however, differ by larger percentages. For example, financial management costs in the ABC model are 185% higher than comparable costs reported in Convair’s accounting system.<sup>55</sup> No attempt is made to elaborate on these differences by explaining or investigating them. In a final attempt to evaluate the information, a team of four accountants and two consultants from D&T individually fill out surveys collecting their estimates of non-value-added costs for each activity in the ABC model. Next, average estimates by the team are compared to the ABC model. Although the majority of these comparisons are within three%, a few comparisons find larger unexplained differences in comparable accounting information that could imply that the information and/or the teams’ estimates could contain distortions or errors. For example, the team estimates that 89% of the total costs of the Manage and Support the Division process are non-value-added but the ABC model indicates that the percentage is only 71%.<sup>56</sup> Significantly, no effort is made to debate, elab-

<sup>47</sup> Interview with Controller (June 23, 1994).

<sup>48</sup> “Advanced cost management system (ACMS) steering committee meeting #2,” internal Convair document prepared by Convair and D&T (May 24, 1991), p. 12.

<sup>49</sup> *ibid.*, p. 55.

<sup>50</sup> “Advanced cost management system (ACMS) deployment,” internal Convair memo (July 26, 1991), p. 2.

<sup>51</sup> “Advanced cost management system (ACMS) steering committee meeting #3,” internal Convair document prepared by Convair and D&T (June 12, 1991), p. 67.

<sup>52</sup> *ibid.*, p. 36.

<sup>47</sup> “Advanced cost management system (ACMS) survey #1,” internal Convair document prepared by Convair and D&T (March 4, 1991), p. 5.

<sup>48</sup> “Advanced cost management system (ACMS) survey #3,” internal Convair document prepared by Convair and D&T (April 19, 1991), p. 2.

<sup>49</sup> “Advanced cost management system (ACMS) steering committee meeting #1,” internal Convair document prepared by Convair and D&T (May 10, 1991), pp. 10–14.

<sup>50</sup> Interview with Controller (June 23, 1994).

orate on, or investigate these differences. Managers also question non-value-added costs in the ABC model:

“during the survey, there was considerable disagreement about the definition of value-added. [Several managers argued that...t]he description of an activity as value-added or non-value added is a subjective one that varies with each person’s perspective.”<sup>57</sup>

As the result, a new survey is planned to clarify and better standardize the definition of non-value-added cost but it is not implemented due to the urgency to change the organization.

Bain reports the results of its special study on the financial consequences of outsourcing Convair’s fabrication process. It estimates that Convair can save \$28 M annually if its entire fabrication process is outsourced. Managers’ voice concerns, however, about the quality of Bain’s analysis and raise questions, for example:

“Is Bain’s estimated cost savings overstated in order to sell Convair additional outsourcing services?”<sup>58</sup>

As another example, a procurement manager reports the following:

“number one concern...[which is the c]redibility in Bain’s estimates of material costs and savings. [He asks s]hould we hire another consultant to ‘verify’ Bain’s conclusions?”<sup>59</sup>

D&T apparently assumes that the ABC model information has sufficient credibility to be persuasive as the basis for the organizational change. D&T puts forth the ABC model as evidence that “We should be able to identify \$55–\$100 M of cost reduction within 3–4 months.”<sup>60</sup> This argument, however, is not persuasive to central managers who continue to have reservations about the credibility of the information. Minutes of the ABC model steering committee meeting document central managers’ concern: “Are the data...accurate?”<sup>61</sup> Thus the steering committee instructs the ABC model team to “Review [the] data integrity [of the] costing process.”<sup>62</sup> Despite the urgency to implement a plan for organizational change, the central managers ask for:

“more...training, more time developing & validating Division activities, consistent application of definitions and [ABC model] database cleanup.”<sup>63</sup>

As in period 1 and despite the development of several attractive plans for solving Convair’s crisis that are based on the accounting information, none of the plans for organizational change from period 1 or 2 are implemented. By the end of period 2, all consultants leave Convair.

### Period 3

Period 3 is the first time members of a cross-functional team (CFT) are assigned by central managers to evaluate the quality of the accounting information. Early in period 3, Convair’s strategy and structure is changed to “move focus from control to communication...[and] shift emphasis from individual output to the productivity of cross-functional teams.”<sup>64</sup> The five central managers on the ABC model committee sign and distribute a letter stating that:

“As the [ABC] steering committee for this project, we have decided to expand its role...We have directed...[that a] cross-functional team will be assigned to understand the division’s material management process...This team will establish a current baseline...and develop process improvement plans. Results from this analysis will determine how we proceed with other Convair business processes using [the ABC model].”<sup>65</sup>

CFT members bypass middle management and report directly to the ABC model steering committee and to a new investment-reduction steering committee composed of central managers from seven of Convair’s largest functions. This new CFT is comprised of lower-level managers or their representatives from five functions—accounting (the first author), engineering, operations, procurement and product-line management—and a manager from quality assurance also sometimes participates in CFT meetings.

The CFT members are explicitly given access to all the accounting information constructed during the previous two periods. Before the first CFT meeting, members are given materials including a summary of Convair’s strategic plan that highlights dramatic reductions in sales forecasts associated with Convair’s crisis, several reports containing the accounting information, and a few articles about ABC and CFTs. For example, one article (originally supplied by D&T to the ABC model steering committee in period 2) explains the dynamic that emerges in CFTs:

“Early on, [CFT members] identify friends and foes...[and] get advice from both friends and foes. Understanding the arguments both for and against the project will help you complete your written or oral presentation package.”<sup>66</sup>

At the CFT’s first meeting, members introduce themselves and then receive training and an overview from three accountants (two additional accountants attend this

<sup>57</sup> “Advanced cost management system (ACMS) survey #4,” internal Convair document prepared by Convair and D&T (September 21, 1991), p. 5.

<sup>58</sup> Interview with Procurement Manager (March 14, 1994).

<sup>59</sup> “Input to Bain package,” internal Convair document prepared by Convair (March 30, 1992), p. 1.

<sup>60</sup> “Advanced cost management system (ACMS) steering committee meeting #2,” internal Convair document prepared by Convair and D&T (May 24, 1991), p. 31.

<sup>61</sup> “Advanced cost management system (ACMS) steering committee meeting #3,” internal Convair document prepared by Convair and D&T (June 12, 1991), p. 12.

<sup>62</sup> Minutes from steering committee meeting #1, reported in “Advanced cost management system (ACMS) steering committee meeting #2,” internal Convair document prepared by Convair and D&T (May 24, 1991), p. 1.

<sup>63</sup> “ACMS lessons learned,” internal Convair document prepared by Convair and D&T (September 5, 1991), p. 1.

<sup>64</sup> “Convair total quality management plan,” internal Convair document (January 17, 1991), p. 44.

<sup>65</sup> “Advanced cost management system (ACMS) deployment,” internal Convair memo (October 30, 1991), p. 1.

<sup>66</sup> Ayers, J. B. (1988). Selling change requires a change in selling technique—Link proposals to strategy. *Industrial Engineering*, July, p. 32.

meeting) on the content of the accounting information constructed in periods 1 and 2. The training materials include samples of survey materials and many reports containing the accounting information. Much of this information focuses on the material management process that is the CFT members' primary area of interest. For example, reports from the ABC model indicate that the scope of the material management process spans 11 functions and 63 departments, and incorporates 55 activities and 71 cost drivers, for a total annual cost of \$63 M, of which 60% is non-value-added.<sup>67</sup>

After the training, CFT members discuss the ABC model steering committee's expectations and intentions that led to the formation of their CFT. The ABC model steering committee's letter asks the CFT to use the ABC model to document its process for the benefit of future CFTs. Next, CFT members talk about their separate and joint roles and agree to "Use the [ABC] model to support justification to fix problems"<sup>68</sup> and to "Help selling changes through implementation."<sup>69</sup>

In the final portion of the first meeting, CFT members begin asking questions and debating some tentative answers based on information from a variety of reports containing the accounting information. There is particular interest in investigating the details of the special study prepared by the accountants and reported to the ABC model steering committee. This investigation leads to the formation of the CFT and the selection of material management as the first process for the CFT to examine. Concerns are voiced that this special study is constructed by accountants with little input from the various department managers involved with the material management process. There are also concerns about the credibility of the non-value-added cost information that the special study is based on. To address these concerns and questions, several sources of information are provided by the accounting team member before the next meeting, including information from the accounting and E&Y special studies, McKinsey benchmarking information, and the ABC model.

In the second meeting, team members spend over 6 h examining detailed- and summary-level accounting information about the material management process. CFT members begin the second meeting by examining the special study that led to the formation of the CFT (previously developed by accountants at the request of the ABC model steering committee). CFT members express concerns about the persuasiveness of the survey and interview information used to construct the special study and also about the assumptions that the accountants made to construct it (e.g., activity costs are entirely variable with respect to changes in cost drivers).<sup>70</sup>

CFT members turn to examining reports from the ABC model, E&Y's special study, and McKinsey's benchmarking. They find that all three sources of accounting information agree on the ranking of the performance of the material management process relative to Convair's other processes. All three sources of information indicate that the material management process is one of Convair's two poorest performing processes out of the seven processes. This convergence among the three sources is documented by the CFT. Ultimately, CFT members decide to include a summary of this convergence analysis in their final report to the ABC model and investment-reduction steering committees.

The second meeting ends after several hours of analyzing, comparing, and debating details of the accounting information. For example, Convair's administration cost in the ABC model and in Convair's accounting system are initially found to differ (19% and 11% of Convair's total cost, respectively).<sup>71</sup> Further analysis, however, reveals administration costs as a percentage of the material management process and of the total division cost are similar using the ABC model information (4.6% and 4.9%, respectively).<sup>72</sup> Convergent information is also found for the cost of government requirements across Convair's two government product lines.<sup>73</sup> After these similarities are found, there is no further analysis of administration or government-requirement costs. The CFT members document the agreement in the above comparative analyses. Later, CFT members decide to incorporate this comparative analysis into their final report to the ABC model and the investment reduction steering committees.

The CFT members begin the third meeting by evaluating the non-value-added cost information in the ABC model. Members all agree that non-value added cost is a potentially important measure for identifying where and by how much the performance of the process can be improved.

Next, the CFT examines a large difference in a report, previously mentioned in period 2, which shows a comparison of non-value-added costs from the ABC model versus independent estimates by a team of accountants and consultants from D&T. Although the ABC model reports that non-value-added costs are 60% of the total material management process cost, D&T and Convair accounting employees independently estimate that on average non-value-added costs is 86% of the total cost. Instead of relying on the various sources of information constructed in periods 1 and 2 to plan the organizational change, CFT members continue to evaluate the quality of this information.

In the process of investigating this difference, a large error is quickly identified. All seven activities for the automated warehouse are classified as 100% value added. CFT members quickly agree that these activities are clearly 100% non-value-added. Another difference is identified and elaborated on when the quality assurance manager

<sup>67</sup> "Material Management process cross-functional team recommendations to the Material Management process steering committee," internal Convair document (January 29, 1992), p. 11.

<sup>68</sup> "Minutes of meeting #1, material management process team," Convair interoffice memorandum, (October 31, 1991), p. 1.

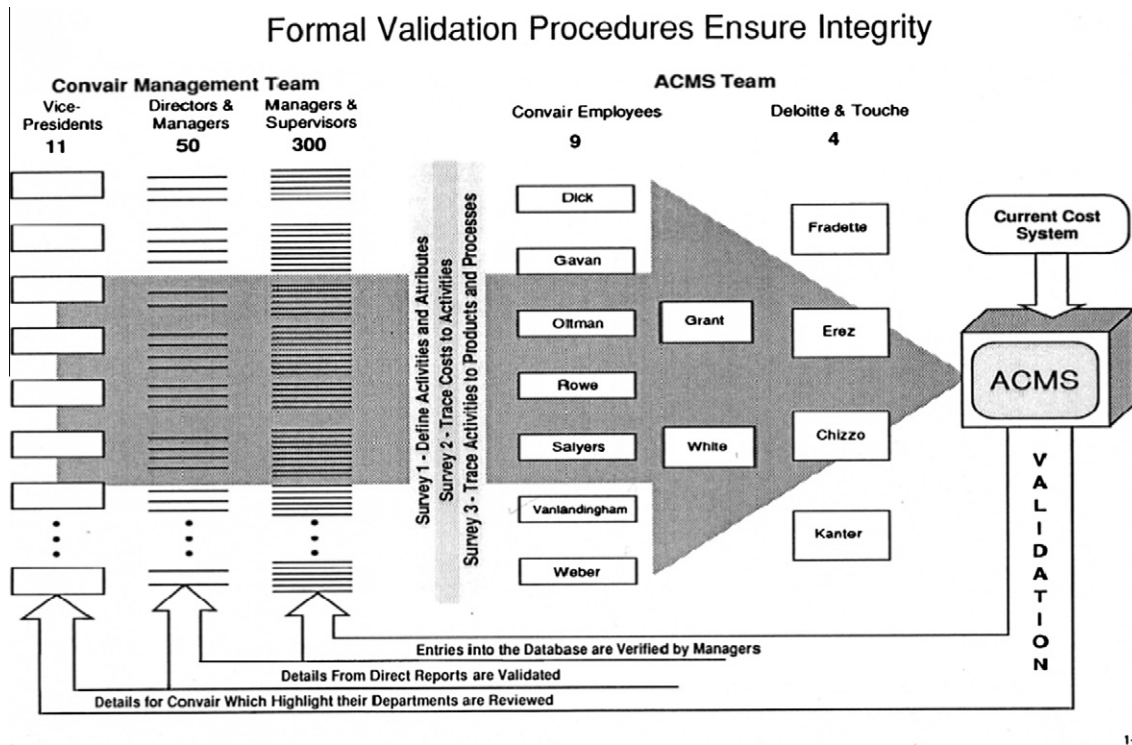
<sup>69</sup> Convair interoffice memorandum, (October 31, 1991).

<sup>70</sup> "Minutes of meeting #2, material management process team," Convair interoffice memorandum, (November 5, 1991), p. 1.

<sup>71</sup> "Advanced cost management system (ACMS)," Convair interoffice memorandum, (November 5, 1991), p. 2.

<sup>72</sup> "Minutes of meeting #2, material management process team," Convair interoffice memorandum, (November 5, 1991), p. 4.

<sup>73</sup> "ACMS division data: Government requirements by process and product line," internal Convair document (November 11, 1991), p. 1.



**Fig. 1.** Convair document providing an overview of procedures for validating the accounting information in period 2<sup>a</sup>. a – To simplify exposition, the advanced cost management system (ACMS) (Convair’s term) is referred to as the division-wide ABC model.

notices an unusual activity in the procurement function. He asks the Procurement manager:

“What is [the] constraint resolution [activity in your function] and why is it 100 percent value-added?”

Obviously embarrassed, the Procurement manager admits that in order to avoid pressure to reduce procurement costs, several of his managers had agreed to create a new activity labeled “constraint resolution” intended to hide the substantial costs associated with managing the large number of material shortages. He confessed that the activity is really 100% non-value-added cost and it is better described as “tracking and resolving material shortages.” The Procurement manager agrees to correct this intentional distortion. As a result of these corrections, non-value-added cost increases by \$11 M, which explains most of the difference between the ABC model and the independently estimated non-value-added cost measures. After the above changes to non-value-added costs in the ABC model, the CFT members move onto analyze other information. Although the CFT members document these corrections, they withhold information about correcting the intentionally distorted procurement costs from the team’s final report to allow the procurement CFT member to save face.

Later in the third meeting, CFT members change their strategy from analyzing, comparing, and debating information from reports containing the accounting information to elaborating on this information to enable additional analysis, comparison, and debate. During this debate, CFT member’s questions sometimes cannot be answered. When CFT members generally agree that the unanswered question is

important, a member often accepts an action item to go back to his or her function to try to find an answer and report back to the CFT. For example, it becomes apparent that the number of material shortages is a particularly important cost driver for managing costs and this leads to the question of “why are there so many material shortages?”<sup>74</sup> The operations member of the CFT takes the action item to investigate this question. She reports in the next meeting with a PowerPoint presentation that outlines another CFT’s recent special study investigating the causes of material shortages. Two CFT members later interview several members of this other CFT to ask questions about their analysis. The two CFT members then report to the CFT with their evaluation. Following this evaluation, CFT members agree to use the other CFT’s special study by incorporating it into their accounting information.

Substantial time and effort is spent constructing activity groups, which provide a “meaningful characteristic of an activity that helps to segregate, analyze, organize or group a set of activities within a business process or product line.”<sup>75</sup> Although the capability and information necessary to construct activity groups is available in period 2, little effort is made to use this capability until period 3 when the CFT spends many hours constructing and refining several user-defined activity groups.

<sup>74</sup> “Minutes of meeting #3, material management process team,” Convair interoffice memorandum, (November 11, 1991), p. 5.

<sup>75</sup> “Advanced cost management system (ACMS) steering committee meeting #1,” internal Convair document prepared by Convair and D&T (May 10, 1991), p. 12.

After much debate, the CFT agrees to tentatively create six activity groups for grouping all activities and their associated information (cost drivers, non-value-added) in the material management process: administration, move material, negotiate material contracts, planning, receive, inspect and stock material, and requirements management.<sup>76</sup> Before the next meeting, the new reports are generated incorporating the new activity group structure for the material management process as well as for each of Convair's six other processes and then these reports are distributed to the CFT members.<sup>77</sup>

In the fourth meeting, CFT members concentrate on examining information structured by the new activity groups and begin by questioning why large differences exist in the proportion of planning activity group costs to total costs across comparable product lines.<sup>78</sup> Further investigation reveals that many important activities are missing and that these activities are misclassified as being part of other processes. After finding this large error, "activities were tentatively added to material management to capture [the misclassified activities]."<sup>79</sup> This correction adds \$14.3 M to the cost of the process.<sup>80</sup> CFT members spend the remainder of this meeting debating and elaborating on the new activity groups. Instead of identifying and correcting intentional distortions and unintentional errors, the elaboration centers on clearly demarcating and labeling the content of the activity groups for the purpose of communicating summary-level information to the ABC model and investment reduction steering committees. During the fourth meeting, CFT members reach agreement that:

"All material management process activity groups have significant levels of non-value-added opportunities [for reorganizational change]."<sup>81</sup>

Despite the urgency to develop a plan for organizational change, the CFT members spend more time than they and others expect debating the credibility of the accounting information and elaborating on this information before they agree that it is persuasive for beginning to develop plans to change the organization. For example, the schedule the CFT members jointly set in their first meeting indicates that they expect to verify the information and begin to bring the information into play for planning organizational change in their second meeting.<sup>82</sup> Contrary to the schedule, the CFT does not begin relying on the accounting information to develop solutions to the crisis until its fifth and sixth meetings.<sup>83</sup>

Later, additional information is submitted to the CFT in its seventh meeting as the CFT is refining its plans for its presentation to the ABC model and investment-reduction steering committees. The engineering manager on the CFT produces a letter addressed to the CFT from his director stating that:

"A study was undertaken [by the software engineering department] to determine [the expected cost savings from implementing the engineering materials request initiative]. The results indicate that a yearly cost avoidance of \$917,000 can be expected."<sup>84</sup>

The Engineering Director apparently believes that the CFT members will accept his cost estimates uncritically. CFT members, however, ask the engineering member to provide evidence of these cost savings using the ABC model. When he fails to do so, CFT members convince the engineering CFT member to drop the initiative due to lack of information to support it. Meetings eight through 11 focus on using the information to develop plans to change the organization.

Following making many comparisons and much debate about and elaboration on the accounting information, for the first time managers from different functions all agree the accounting information is persuasive for planning organizational change. (The CFT's process for using this information to plan the organizational change is outside the scope of this study.)

Before presenting their plan for organizational change to the ABC model and investment-reduction steering committees, the CFT members are asked to present it to two evaluation CFTs (ECFT). The ECFTs each report their evaluations to the investment-reduction steering committee. The members of the CFT state that "our preliminary findings and recommendations were presented to the [ECFT]...The feedback was positive."<sup>85</sup> The written response from the first ECFT to the investment-reduction steering committee is that "The [ECFT] generally felt that [the CFT] should proceed as planned."<sup>86</sup> The second ECFT also explicitly agrees with the CFT's analysis.

Finally, in the 12th meeting the CFT formally presents its analysis of the accounting information and its plan for organizational change based on that information to the ABC model and investment-reduction steering committees. This presentation lasts approximately 2 h and also includes about 20 managers from various functions in the material management process. In the presentation, CFT members explain their 28-page report that is also their CFT's PowerPoint presentation.<sup>87</sup> During the presentation, investment-reduction steering committee members ask many questions. For example, how are the CFT's planned cost savings for the material management process distrib-

<sup>76</sup> "Minutes of meeting #3, material management process team," Convair interoffice memorandum, (November 11, 1991), p. 1.

<sup>77</sup> *ibid.*, p. 3.

<sup>78</sup> "Minutes of meeting #4, material management process team," Convair interoffice memorandum, (November 15, 1991), p. 3.

<sup>79</sup> Convair interoffice memorandum, (November 15, 1991), p. 5.

<sup>80</sup> "Material management process cross-functional team recommendations to the Material Management process steering committee," internal Convair document (January 29, 1992), p. 4.

<sup>81</sup> "Minutes of meeting #4, material management process team," Convair interoffice memorandum, (November 15, 1991), p. 6.

<sup>82</sup> "Minutes of meeting #1, material management process team," Convair interoffice memorandum, (October 31, 1991), p. 1.

<sup>83</sup> "Interoffice Memorandum, Minutes of Meeting #5, Material Management process team," internal Convair document (November 22, 1991), p. 2.

<sup>84</sup> "Interoffice Memorandum, Minutes of Meeting #7, Material Management process team," internal Convair document (December 5, 1991), p. 4.

<sup>85</sup> "Interoffice Memorandum, Minutes of Meeting #10, Material Management process team," internal Convair document (December 20, 1991), p. 1.

<sup>86</sup> "Investment reduction SET team minutes," Convair interoffice memorandum (December 6, 1991), p. 1.

<sup>87</sup> "Material Management process cross-functional team recommendations to the Material Management process steering committee," internal Convair document (January 29, 1992), pp. 1–28.



uted across functions and departments in Convair's hierarchy?

After the presentation, a central manager from procurement and a mid-level manager from engineering privately protest the plan. The investment-reduction steering committee members listen to the two manager's concerns that the plan is not equitable and that it fails to include the engineering material request initiative. The investment-reduction steering committee, however, ratifies the CFT's plan without any changes for immediate implementation. This marks the first time broad agreement is reached that the accounting information is of sufficient quality to be persuasive for planning the organizational change.

## Discussion

This study contributes to the accounting literature by providing theory and field evidence on how players harden soft accounting information so that there is interpersonal agreement that the information is of sufficient quality (e.g., objective, reliable) and thus persuasive to use for planning organizational change. We model four patterns of players and comparability of soft accounting information that are expected to influence the emergence of the rules of the game that constitutes each hardening game (Table 1). This section provides a discussion of our interpretation of the field evidence in relation to the four games, limitations of this study, and questions for future research.

### *Interpretation of field evidence*

In period 1, the players (accountants and consultants) attempt to validate the accounting information that is constructed in this period (ABC pilots, benchmarking, special study). The game that emerges is consistent with our expectation that a faith game will emerge when the players are accountants and/or consultants and the soft accounting information has low comparability (low standardization, technical language, only a few possible comparisons) (Table 1).

The pattern of social interactions observed is also consistent with the rules of a faith game, in which the players focus on properly implementing appropriate practices for constructing accounting information rather than validating the information per se. In consequence, users (central managers) express concerns that insufficient effort has been devoted by the players to evaluating, validating, and verifying the accounting information. For example, McKinsey focuses on documenting its benchmarking practice rather than auditing or otherwise validating its benchmarking information. Although players agree to use some of the accounting information to develop a plan for organizational change, implying that they believe that it is hard, users do not agree to use the information because they believe that the information is anecdotal, invalid, and lacks comparability. We interpret the users' disagreement about the quality of the accounting information as indicating that they consider the information to be soft.

In period 2, the players (accountants and consultants) construct additional accounting information (ABC model, ABC-supported plans for organizational change, special studies). The rules of the game that emerge in period 2 have elements of faith and practical-arguments games (Table 1). The players are consistent with the expected players in faith and statistics games. The comparability of the soft accounting information is consistent with the expected information in a practical-arguments game (medium comparability due to medium standardization, plain language, more than a few possible comparisons). Consistent with the rules of a faith game, the players focus on proper implementation of appropriate accounting practices, and consistent with the rules of a practical-arguments game the players elaborate on the soft accounting information in order for the information to support additional comparisons. Contrary to a practical-arguments game, however, the players do not attempt to validate this information through debate that includes players with diverse information and preferences, such as members of CFTs.

We interpret the evidence from period 2 as being consistent with trial-and-error learning about how to harden soft accounting information. In period 1, a faith game is played but it is not successful in hardening the information. In response, in period 2 the comparability of the soft accounting information is changed from a low to a medium level but the players remain the same as in period 1. This results in an unexpected pattern of players and information (see Table 1) with hardening failing to occur. The rules that emerge are partially consistent with the expected rules of a practical-arguments game in that players elaborate on the soft accounting information to increase its comparability but they do not validate the information through debate. A consequence of this unexpected game is that the users (central managers) do not agree that the information is of sufficient quality to plan organizational change. That is, the users do not agree that the information is hard enough to use.

At the beginning of period 3, the players change from accountants and consultants to members of CFTs who attempt to validate much of the soft accounting information constructed in periods 1–3. The players (CFT members) and the comparability of the soft accounting information (medium comparability due to medium standardization, plain language, more than a few possible comparisons) are consistent with the emergence of a practical-arguments game (Table 1).

Consistent with the expected rules of a practical-arguments game, members of the CFTs have many debates about the validity of the accounting information and they exert considerable effort in many meetings to elaborate on this information by identifying and correcting unintentional errors and intentional distortions and thereby reconciling the information to make it more comparable and therefore hard. In addition, there is much elaboration that documents details of the players' process of evaluating, investigating, and correcting the accounting information, including how they discover distortions of and errors in the information. They construct activity groups to enable additional comparative analysis,

debate, and player triangulation. This is the only period in which the players persuade the users (central managers) to agree that the information is hard as evidenced by the users' ratification of organizational change proposed by the players based on their carefully documented evaluation of and elaboration on the accounting information. Thus, we interpret the evidence presented in period 3 as being consistent with a practical-arguments game in terms of the players, comparability of the soft accounting information, and the rules the players agree to play their game by (Table 1).

Overall, we interpret the evidence from the field study as providing support for our expectation that the comparability of soft accounting information and the players who participate in hardening the information influence the emergence of the rules by which the players agree to harden soft accounting information. In periods 1 and 2, the soft accounting information is not hardened as evidenced by the users not agreeing to use the information. In period 1, the users do not believe the players' faith game has hardened the information in part because the players do not focus on validating the information per se. In response, by trial-and-error learning, in period 2 the information is changed but not the players, which results in an ineffective pattern of players and information for hardening the information to the satisfaction of the users. In period 3, the trial-and-error learning continues, in this period by using the information from period 2 along with additional information constructed during period 3 but changing the players from accountants and consultants to members of CFTs. In contrast to the prior periods, in period 3 both the players and information are suggestive of a practical-arguments game with rules regarding critical debates and analyses of the information by a group whose members have diverse information and preferences. This game convinces the users that the information is of sufficient quality so as to be usable by them. Thus, our evidence is consistent with hardening being successful when a practical-arguments game emerges, otherwise hardening is not successful.

We interpret the field evidence as indicating that the practical-arguments game is effective because users are likely to believe that it is more democratic and legitimate than the other hardening games. Users are also likely to believe this because the practical-arguments game relies on broad public debate and significant documentation regarding how the players harden information using non-technical language, which makes the game transparent and understandable to users. The field study evidence is consistent with our interpretation that the practical-arguments game appears to bring intentional distortions of soft accounting information out into the open where it is subject to public scrutiny and social pressure. This results in players hardening information that is potentially costly to them but beneficial to their organization. The above factors may explain why the practical-arguments game seems to be effective at persuading users that the information is of sufficient quality and thus hard enough to be persuasive and useful for planning organizational change.

### Limitations

This study has the usual limitations associated with a longitudinal field study including low control over the empirical space, observer effects, and more going on in the field than the researchers can observe and report (Ahrens & Chapman, 2006). A particularly important limitation of this field study is that it does not provide evidence on statistics and power-and-politics games, possibly due to the context of the organizational change in this field study.

### Questions for research

Our field study examines whether and how soft accounting information and players influence the emergence and effectiveness of hardening games for socially processing the information into hard information that people agree to use for planning organizational change. To simplify our study, the payoffs associated with hardening information are assumed to be constant. It is likely, however, that as information is hardened the payoffs the players expect to receive will change, which can influence how they play their game. Research might address questions such as: Does the process of hardening soft accounting information influence how players interpret their payoffs and thus how they play their game? Is practical arguments always the most effective game for hardening soft accounting information? In what contexts would we expect other games such as power and politics or statistics to emerge and be effective at hardening soft accounting information? These and other questions are worthy of being answered by research on when and how people harden soft accounting information and factors that affect how and how well that information is hardened to make it persuasive.

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