

**Information Age Accounting:  
Catalyst and Enabler of the Self-Organizing Enterprise  
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**Executive Summary**

A paradox of the Information Age is that while the sheer quantity of data and information has grown exponentially, the quality of understanding is typically declining. New technologies are driving accelerating change and complexity, leading to greatly increased uncertainty and heightened business risk.

There is widespread recognition that the old "command and control" decisionmaking model, which relied on the insights of the "brains at the top" of the organization, is inadequate to cope with today's challenges. Yet nothing has emerged to take its place. Management has responded to change by reengineering core processes and decentralizing decisionmaking through "empowerment" of employees and cross-functional teams; but such efforts, while a step in the right direction, have generally not been successful. Instead of increasing the organization's capacity for creative and timely response to radical changes in the marketplace, the changes frequently have amounted to mere downsizing – leaving the organization and its employees more anxious and fearful of change than before.

What has been lacking as support for true empowerment is a "self-referencing capability" for the employees and the organization as a whole: a new form of accounting that will go beyond traditional after-the-fact summaries of transactions and overall financial performance.

The information contained in traditional accounting systems and management information systems is not structured in a manner that facilitates a shared understanding of the business. It does not convey whether value is being created, or whether progress in fulfilling organizational purpose is being achieved. And it does not empower employees in a way that enables them to make a significant contribution – let alone to contribute the front-line insights that are essential to keep the organization in touch with marketplace reality.

To bring the "self-organizing enterprise" into existence, a new accounting system must be created – one that does not merely monitor the empowerment process more closely, but actively facilitates it. This mechanism is the new accounting system that we refer to as Information Age Accounting (IAA).

Unlike today's accounting, which provides after-the-fact analysis, IAA will provide the organization with real-time information that establishes a clear basis for decisionmaking. Unlike today's balance sheets, which reflect the resource-based economy of the Industrial Age, IAA will inform investors, employees and other stakeholders of the organization's true potential for long-term profitability and growth, which is increasingly based on intellectual assets: the ability to innovate, to generate creative strategies, and to implement them more quickly than competitors. And by keeping the organization itself focused on those factors, IAA will also serve as the foundation for the continuous organizational restructuring that will be necessary in the future, enabling employees to become self-regulated, self-motivated, and self-improving (Figure 1).

**The Business Enterprise and a New World View**

Clearly, these are ambitious goals. Yet this new and expanded approach to accounting is in harmony with the radical changes now taking place in business and every aspect of political and social life, driven by new technologies and increased global competition. On a deeper level, the new approach also reflects humanity's passage into a new mode of thinking: Systems Thinking, which views systems and their contexts as a unified whole.

From time immemorial, humankind has sought to attain greater control over its destiny by conceptually dividing the world into disparate parts. This analytical approach gained ascendancy after the Renaissance, when Galileo proved with the aid of a telescope that the earth revolved around the sun and Newton set forth the laws that governed the movement of the planets and all motion and matter, describing the universe as a machine, "a hermetically sealed clock."

By 1776, analysis had been applied to business in Adam Smith's *The Wealth of Nations*, which explained how mass production could organize and divide up work in order to produce goods at a fraction of the cost of individual craftsmen. The source of wealth was no longer human muscle or human brains, but energy applied to matter, with humans as an extension of the machine.

But these assumptions were shaken in the 20th century. Einstein's theory of relativity, and the quantum physics that followed, led to the discovery that at the center of the atom there was nothing — only a field of energy.

A related discovery, the Heisenberg Principle, demonstrated that it is impossible to observe simultaneously with high precision the position as well as the velocity of a particle. It showed, moreover, that the act of measurement is itself a tool of fragmentation that cannot be applied effectively to a part of the whole, but must incorporate the entire field of change.

The limitations of reductionist thinking were further highlighted by a new science, “general systems theory,” inaugurated in a 1950 book by the biologist Van Bertalanffy, who noted that certain common properties were present in all systems, including animal life, the physical universe and human civilization. Jay Forrester of MIT made a unique contribution to the field of System Dynamics by developing techniques for applying these concepts to the study of business organizations, and, in recent years, organizational theorists such as Russell Ackoff, Peter Senge and Margaret Wheatley have built on the foundation he created.

General systems theory teaches that all successful systems contain “self-organizing principles” that allow them to adapt in order to preserve themselves. It further teaches that the essential properties that define any system are properties of the whole, possessed by none of its parts. The whole is not the sum of its parts, but the product of these parts’ interactions, all within a broader system. Synthesis, the opposite of analysis, is thus required for true understanding: it is important to make sure not just that the system is working efficiently, but that it is doing the right things in its broader context.

Applying these principles of “systems thinking,” it is clear that to survive and prosper in this ever-changing world, the business organization must incorporate a “self-organizing principle” that enables it to obtain and process the full range of information it needs in order to deal with complexity. The business must not only make sense of itself, but must also understand the external, larger system of which it is a part — and it must do this in real time, not after the fact.

In harmony with these principles, Information Age Accounting measures the full range of the organization’s growth and development as it occurs. Moreover, because IAA is able to serve as the central source of management information and overall organizational learning, it actually enables growth to occur. Far more than traditional accounting, Information Age Accounting is in alignment with the new factors creating organizational value in the Information Age.

### **The New Factors Creating Value**

In the Industrial Age, when the pace of change was slow, a company’s profitability was largely the result of its geographic access to raw materials and to markets for its finished goods. Barriers to entry were substantial, and product lives were long. Market dominance could be sustained for long periods of time, with fairly predictable financial results.

Under these conditions, traditional accounting was suitable as a measurement tool. However, in a time when the sources of profit in the new brainpowered economy are largely intangible, and subject to rapid change, traditional accounting has severe limitations.

As Peter Drucker has noted, traditional “profit” is actually a cost — the cost of capital that one must earn to stay in business. The only true profit is the excess over the cost of capital that may be realized through market dominance for the relatively short time after introducing a new product. With this time cut to the minimum in the post-industrial world, profitability becomes largely a function of innovation in new product development, creativity in strategy formulation, and speed in getting new products to market.

Since it continues to focus on measuring physical assets and transactions, traditional accounting fails to place sufficient emphasis on the innovation, creativity and organizational learning that increasingly constitute a large portion of an organization’s value and future potential. Further, by skewing measurement toward the short-term needs of investors, the old accounting limits the organization’s ability to understand how it can best create value over the longer term. In addition, traditional accounting largely fails to depict organizational performance in the context of the larger economic system and the major trends affecting that performance.

Information Age Accounting, by contrast, creates a framework that enables employees to understand the business as a system — treating it as an indivisible whole, and making its complex workings explicit and intelligible in order to show how it creates value. Information Age Accounting begins by identifying all key variables in the value creation process; describing how they are connected; and, specifically, displaying the interactions of such “soft variables” as commitment, innovation, customer loyalty, organizational learning, and others that drive value creation in the Information Age. And it uses the best possible source of accurate information on these factors: none other than the empowered teams of cross-functional decisionmakers themselves.

### **A Participative Decisionmaking Process**

The new decisionmaking process made possible by Information Age Accounting will be both decentralized and participative. Cross-functional teams will meet to share their observations, to collaborate on diagnosing problems, and to formulate strategies for business success and continuous improvement.

Though this process will be collaborative, it will require skilled facilitation, using computer networking tools that can handle complexity. Facilitators will, in turn, need to have an objective and holistic view of the corporation, as well as the documentation skills to develop reports that reflect the consensus of the group, and that provide all participants with sufficient knowledge of the system to act on the information provided. Facilitators will enable the teams to simulate and assess the impact of their actions on the whole business before decisions are made – and will also allow information to be rapidly summarized and disseminated throughout the organization, thus assuring that all teams have the benefit of each team's insights.

The logical candidate to fulfill this role of facilitator is the professional with the firmest grasp of all the factors that create value; the objectivity to test those factors against reality; and the ability to document those results with authority: in short, the new accountant. By improving the gathering of information, as well as thinking and decisionmaking based on that information, the new accountant will be central to the value-creation process.

### **A New Language for Assessing the Whole**

One essential tool deployed by the new accountant will be the causal loop diagram, created by "Systems Thinkers" for explicitly depicting the structure of the organization as a holistic system. Process-owners of cross-functional teams will collaborate in identifying the connections among key variables, and create a graphic representation of the system by connecting corresponding causal loops — which represent the feedback mechanism of reinforcing and balancing forces that are present in every system. This process of connecting the system variables through "closing the loops" is akin to the process of debits and credits in the present transaction-based accounting system.

Making the system explicit means not only drawing the loops that display relationships of key variables and the interaction of the parts, but also explicitly taking into account the time-dimensional factors of speed and delay. If critical success factors are not brought into play at the right time, the most robust strategy could be rendered inoperable, and an entire investment put at risk. The causal loop diagramming process therefore calls for displaying the risk of delay. This time dimension, in turn, adds to the system's ability to depict complexity and simulate many possible futures.

By making the whole system explicit and giving it the dimension of time, causal loop diagramming enables everyone in the organization who is involved in decisionmaking to understand current reality in the light of organizational goals, and to see their own impact on the whole.

### **Dynamic Simulation**

After the relationship of all key variables is agreed to, values are assigned to the variables, and a computer model is developed which can be used to create simulations of organizational performance under various alternative scenarios (Figure 2).

Without the aid of a computer, the human brain is not capable of comprehending and calculating the full range of complexity addressed by Systems Thinking. Causal loop diagrams can display the relationships of the variables that together constitute the "system," but those variables must be quantified before the consequences of these relationships can be fully known. Moreover, using simulation tools to test the model may reveal gaps and errors in the perceived relationships.

Computer simulation can also make it easier for management and employees to strengthen their decisionmaking skills in advance of any real risk. In all other fields of endeavor, such as music or sports, there is extensive learning before the fact. In business, too, the pace of change and high-stakes competition increasingly makes "practice fields" and learning before the fact highly desirable. So far, however, such simulation has been available on only an extremely limited basis.

While no one can predict the future, and projections are instantly obsolete, the computer simulation tools of Information Age Accounting allow users to create numerous alternative views of the future and "practice fields" to learn in advance of action. This facilitates the ability to create proactive strategies, to develop or acquire new core competencies, and to change more rapidly than competitors, rather than sticking with unproductive routines.

Such simulation can also facilitate changes in the organizational structure, represented and tested through changes in the computer model. However, these changes are not necessarily made as a result of the thinking, modeling and learning done at the local “issue” level. Instead, teams pass on the results of their work to a central function which assesses the potential value in adjusting the organization-wide model.

Because the formulas that go into the computer simulation are the very factors that investors seek to discern for their own decisionmaking about the enterprise, the computer model can also serve as a communication tool for selected external stakeholders who may be given passkeys to access the computer model on a customized, selective-access basis... enabling stakeholders to compare actual performance to anticipated results, and thus optimizing their ability to assess organizational value and the true benefits of investment or other alliances. The new accounting system thus creates a “kaleidoscopic” view of multiple scenarios that can help all stakeholders, internal and external, see the hidden consequences of their alternative choices.

### **An Integrated Approach to Decisionmaking**

Because IAA will enable organizations to learn before doing, the linear Shewhart Cycle of “plan, do, monitor, act (change),” will be replaced by a more iterative process that reflects the nonlinear reality caused by accelerating change (Figure 3).

Planning, doing, monitoring and evaluating will all be part of an integrated decisionmaking process, with a high proportion of the learning moved to the front end of the process. Strategic thinking will not be a discrete function separated from the line organization, nor will the evaluation and monitoring be done by a separate group; instead, these activities will be the province of all collaborative decisionmaking groups.

The new model will rely heavily on a system of self-assessment and tools to support Systems Thinking and statistical analysis of business process performance. Each employee will be trained in process mapping, casual loop diagrams and tools of statistical analysis, and encouraged to use them continuously to assess his or her part of the system.

Rather than using computerized knowledge to drive humans, automation will thus be used to support human decisionmaking through the parallel processing of human brains, the most powerful computer of all. People will use their brains for what they do best – creative thinking, interpretation and synthesis – while computers will be used for what they do best, data processing and analysis.

### **Spurring Intrinsic Motivation**

Besides providing the practical benefit of useful real-time information, and learning in advance of the fact, Information Age Accounting will yield a powerful emotional benefit as well: fostering intrinsic employee motivation that gives life to the organization’s purpose.

It is a fundamental law of general systems theory that when a system no longer has a purpose, it dies. An organization’s purpose explains why it exists in terms that attract and motivate people who share its underlying set of behavioral values. The people, in turn, sustain and advance the purpose that gave the organization life.

Organizational purpose is the magnetic pole that aligns employee commitment, providing both the organization’s explicit direction and the rules by which work will be done.

Information Age Accounting provides a mechanism for defining and adhering to organizational purpose — as well as for changing the organization’s direction, when that is appropriate. By creating a holistic view of the organization, it will satisfy employees’ need to know how their contribution relates to the whole.

Thanks to the sharing of information about the impact of specific team actions, the work environment will evolve toward one based on “intrinsic motivation” in which individuals, better able to control their own destiny through information, voluntarily enter into cooperative, mutually beneficial thinking and working relationships with their fellow employees.

This intrinsic motivation will largely replace the extrinsic motivation characteristic of the old command-and-control structure, as the “whip” of external authority is supplanted by employees’ self-management and peer-group assessment. It will spur maximum effort and creative ideas for improvement.

Intrinsic motivation also means that relatively few employees will have as their only jobs monitoring or measuring the work performed by others. Instead, employees will be self-managers, assessing their own performance and the system of which they are a part. By bringing summaries of their work and observations on the system to the attention of their own collaborative, cross-functional decisionmaking teams, employees will be able to evaluate whether they are performing in a manner that optimizes their performance – not just as an individual or function, but as an organization-wide system.

## Parallel Program

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In the hands of the intrinsically motivated employee, self-measurement also translates to self-improvement. "Self-assessment" of performance by the individuals who are themselves accountable for performance will foster pride in workmanship and form the foundation for "first-time quality." The employee will have a better-defined sense of what changes he or she needs to make in order to optimize performance. A finer calibration of performance is also possible when effects are seen immediately, rather than in the ultimate payoff of financial "results."

Ultimately, leadership is accountable to stakeholders for results. But true empowerment means that both leadership and employees are responsible for understanding the system, sharing their vision with other stakeholders, and providing continuous feedback in order to continuously assess organizational performance against this shared vision. Leadership and employees, for example, must be concerned about realizing their organizational potential as it is perceived by the shareowner; and this means that they must fully understand shareholders' expectations concerning profit and dividends.

### **A Common Language of Organizational Potential**

But even beyond questions of immediate profitability, the assessment of organizational potential is at the heart of the accountability process. Leadership and employees must be committed to expanding the longer-term potential of the organization by expanding the industry and creating new business opportunities within it.

Results must be redefined to utilize real economic measures that allow stakeholders to assess whether the organization's potential and capabilities are improving relative to industry and key competitors, and whether adequate progress toward the vision is being made.

Such an assessment requires that the following elements of organizational potential be routinely available through the new accounting system: market size and expected growth rate; relative market position; innovation and related investment required to achieve market share objectives; target costs relative to industry cost structure; relative strategic advantage; relative organizational learning; relative capital structure and financing capability; cost of capital required for new investments; and other relative capabilities, including core competencies, innovativeness, key process performance, strategy alignment, and commitment.

Instead of an undue focus on profits or a "bottom line," attention must be paid to the organization's ability to manage the interrelationships of these key variables... not in a vacuum, but in relation to each other.

### **Forging New External Linkages**

Beyond the organization's ties to investors, there are other crucial external relationships that will be facilitated by the use of Information Age Accounting. For example, the computer models used in IAA can be linked to customer interface systems, enabling organizations to work more effectively with customers in the closer linkages that are being made necessary by competition.

The information that a corporation gathers in order to meet customer requirements can also be shared with its investors and other external stakeholders in order to persuade them that the company is, indeed, in command of its competitive destiny. Enlightened companies will recognize, for example, that by improving the information flow between them and their suppliers – rather than constantly "squeezing" them – they can achieve the kind of cooperative, long-term improvement that can reduce inventories, improve quality, or increase reliability of service.

Even competitors will become more closely allied, as further efforts to minimize risk, increase knowledge and coverage of the global marketplace and reduce the costs of R&D will lead to more joint ventures and "strategic alliances" (like the one between Apple and IBM, for example) that were unthinkable just a short time ago.

In sum, a wide range of trends is working to enmesh corporations ever more inextricably in what may be termed a "web of enterprise" in which the interests of a company's owners are intertwined with those of customers, employees, suppliers and community, and in which information will accordingly need to be shared more openly. Information Age Accounting is an effective and self-renewing response to these trends.

### **Conclusion: A New Mode of Accounting Can Unleash Organizational Potential**

The changing nature of work in the Information Age, and the new ways in which organizations create value, will make inevitable the deployment of a new approach to management information and overall stakeholder communication. And this, in turn, necessitates a new system of accounting and a broader vision of accounting's role.

The existing mode of accounting reinforces the outmoded "command-and-control" management paradigm in which decisions made by a few "smart people" at the top have been the means of controlling the behavior of those

below. It keeps management and employees focused on easily measurable short-term activities, rather than on the more difficult job of building the organizational capabilities, relationships and market positioning that create long-term value.

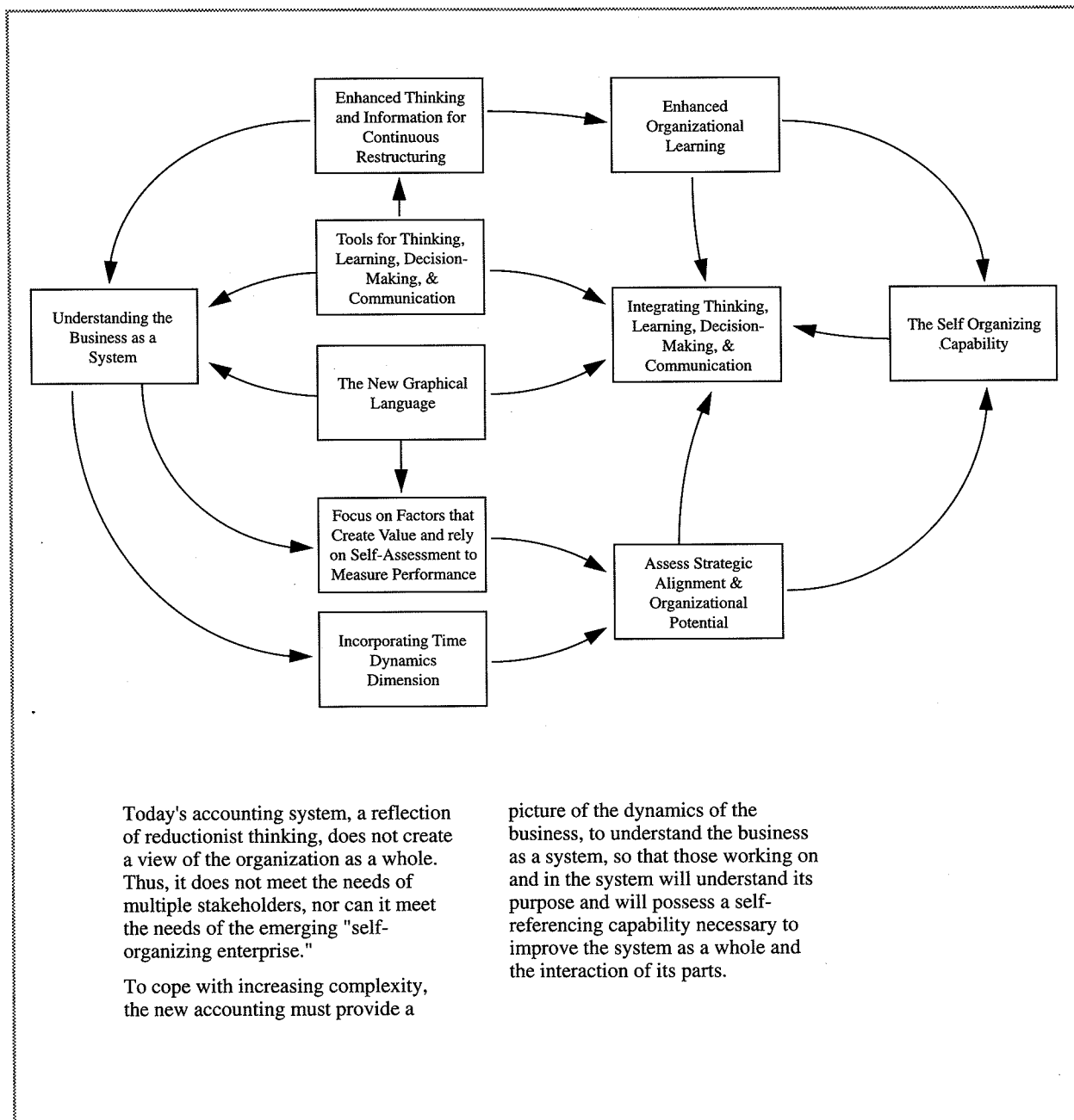
Under the new paradigm, accounting, instead of serving primarily a controlling function, will become primarily a tool for empowerment. In the process, it will actually increase alignment to organizational purpose, a new type of “control,” but without constraining performance. On the contrary, it will yield increased organizational control... derived from the order that emerges out of the disequilibrium created by autonomous structures, and from the self-correcting tendencies provided by enhanced information. And as this enhanced information gives employees and organizations greater control over their own destinies, information will also become an intrinsic motivator, enabling employees to understand and value their contributions to collective success.

Moving from traditional, transaction-based accounting to Information Age Accounting will not, by itself, transform organizations. If it is not implemented in tandem with a vision of employee empowerment, the new accounting system may actually lend itself to greater control through more measurement, rather than better measurement to enable greater empowerment.

But the trend is clear. As technologies evolve to permit the freer and more copious flow of information, humanity is already evolving toward a more democratized organizational form – a “self-organizing enterprise” that derives its competitive advantage from its ability to unleash the potential of all its employees in order to achieve excellence.

Accounting has a golden opportunity to facilitate this process of organizational transformation. It will do so by placing less and less emphasis on taking intermittent and partial snapshots of “results,” and more and more emphasis on developing a comprehensive, continuous understanding of organizations as systems. In providing a “view of the whole” to support empowerment, the new accounting will become an instrument not just of organizational success, but of personal liberation – facilitating the understanding that frees individuals to excel, the social recognition that motivates them to excel, and the collective rewards and learning that will foster their further growth.

Figure 1  
**Information Age Accounting: The Conceptual Framework**

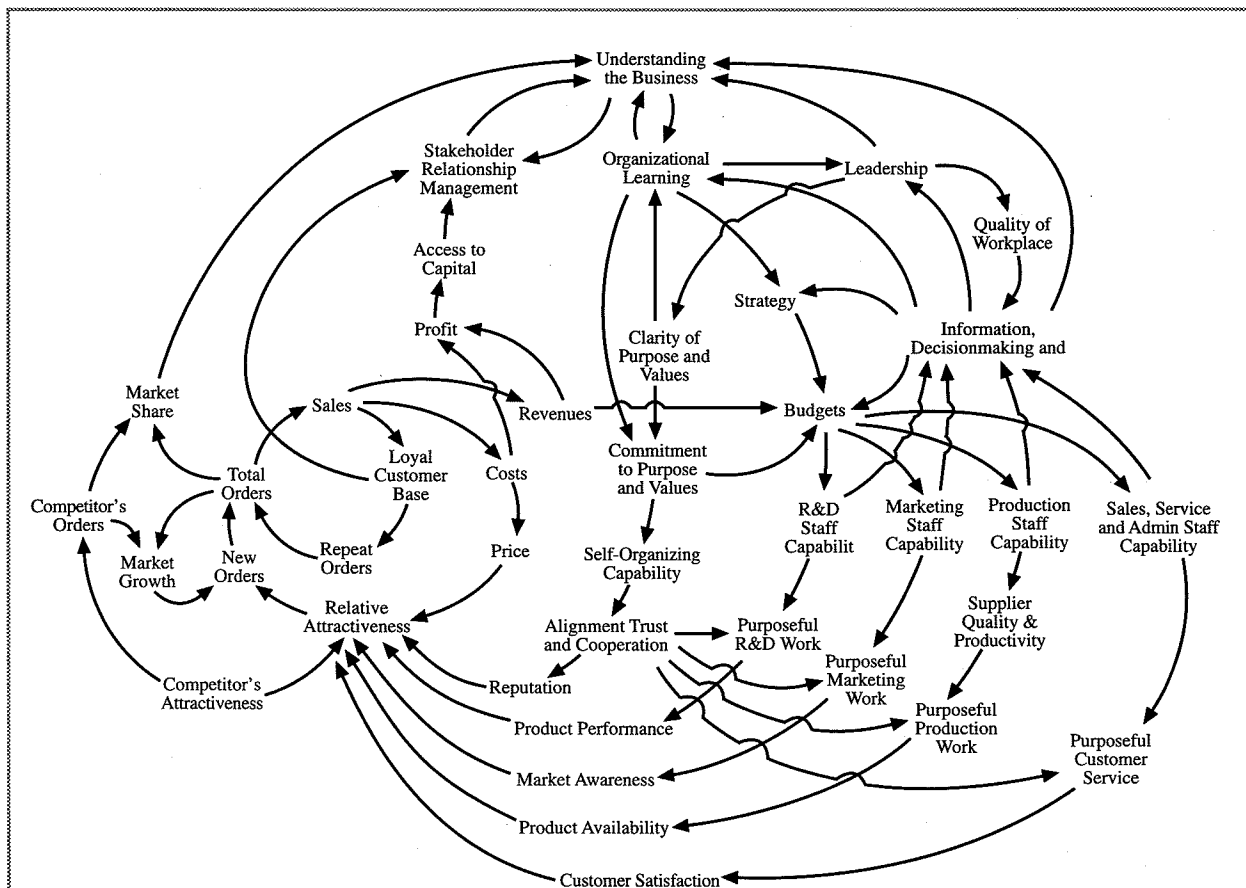


Today's accounting system, a reflection of reductionist thinking, does not create a view of the organization as a whole. Thus, it does not meet the needs of multiple stakeholders, nor can it meet the needs of the emerging "self-organizing enterprise."

To cope with increasing complexity, the new accounting must provide a

picture of the dynamics of the business, to understand the business as a system, so that those working on and in the system will understand its purpose and will possess a self-referencing capability necessary to improve the system as a whole and the interaction of its parts.

Figure 2  
**Information Age Accounting: Enhances Understanding of the Business as a Complex System**



Self-organizing capability depends on two factors — pervasive autonomous structures and a self-referencing capability; i.e., a view of “the whole” organization as a system. Self-referencing capability depends upon the clear articulation of the firm’s purpose and values, combined with an understanding of where the business is positioned on all the important indicators of conformance to purpose and values.

The capability to assess actual vs. desired conformance is enabled by innovative uses of information if designed (a) to enhance the capability and productivity of people throughout the business, and (b) to provide an arena for learning for all employees — i.e., an improved understanding of the business. In this model, an organization evolves through the learning/self-assessment process, by the catalytic effect of a “budgeting” process which

is informed by the company’s commitment to its purpose and values. After some delay — the time required for purposeful investment to be converted to attributes which increase relative attractiveness — the budgeted resources are transformed into more traditional measures (profit, customer feedback, and market share) which confirm the validity of the firm’s business theory.



Figure 3  
**Information Age Accounting: Integrates Thinking, Learning, Decisionmaking and Communicating with the Doing of Purposeful Work**

With the accelerating pace of change, the traditional Shewhart Cycle model of "Plan, Do, Monitor and Act," reflective of a linear view of the world, needs to be modified to reflect a systems view.

In the brain-powered economy, the new goal of organizational design is to enhance "organizational learning" and "self-organizing" capabilities so that Thinking (including strategy formulation) and Doing at a structural and event level are fully integrated in purpose, process and time. In the new economy, thinking and learning should no longer be considered as separate and apart from work.

Planning becomes more of a continuous learning process. And by integrating self-assessment by process-owners with the actual doing of work, and constantly feeding the results into the learning process, the loop of Thinking and Doing is closed. The computer modeling tools that are the "reporting" vehicle of Information Age Accounting are integrated with other communication and decision support tools to operationalize the system.

Shewhart Cycle

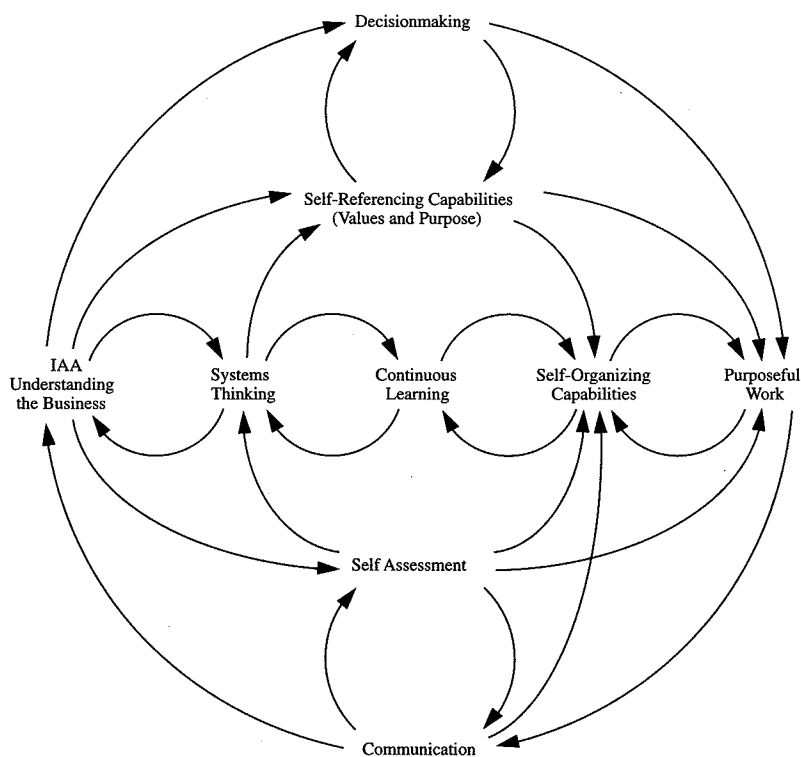
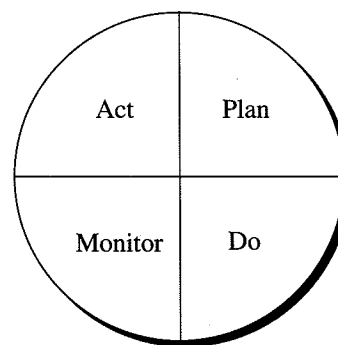


Figure 4  
A New Paradigm for Accounting

OLD	NEW
Financial Information	Information for decisionmaking
Transaction-based	Process-based
Retrospective focus	Future orientated
Reductionist Thinking	Systems Thinking
Incomplete	Holistic
Owner orientation	Multiple stakeholders — customer focus
Company specific	Relative performance and competitive position
Cost-based operating results	Value factors linked to processes and strategies
Production stage focus	Design stage and life cycle focus
Measures inputs, variances and financial results	Measures processes, outcomes and change in organizational potential
Reporting tool	Integrates thinking, learning, decisionmaking and communication
Productivity	Quality, time, service, value and productivity
Monitoring is a discrete function	Self-assessment integrated with work processes
Incomplete analysis of processes	Systems thinking tools
Linear information	Graphics and matrices to explain nonlinear relationships
Limited cross-functional knowledge	Technology-based organizational learning
Static, inert	Dynamic simulation, a learning system
Helps doing things right	Helps doing right things right
Measures book value	Helps create stakeholder value