

**AN AGILITY-BASED OODA MODEL  
FOR THE E-COMMERCE/E-BUSINESS ENTERPRISE**

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## INTRODUCTION

Since the mid-1970's, there has been a subtle yet increasing awareness that the dominant business model of the 20th century, based upon limited product variability and mass production manufacturing techniques, no longer is applicable to the rapidly-fragmenting, information-intensive, electronically wired and individually-customized global marketplace which has emerged. The pervasiveness and universality of this awareness has been accelerated in the past few years with the explosive growth and penetration of the Internet and its diversity of e-Commerce/e-Business implementations.

Post-mass production models to address the new commerce of "controlled chaos" are currently in a state of evolutionary refinement. However, there is widespread agreement that their principal characteristic must be AGILITY, that is, the ability to adapt to, or to lead, constant, accelerated, uncertain and unpredictable change.

Today, the pervasiveness of change in the global business environment is forcing organizations across a broad diversity of manufacturing, service, academic and governmental institutions to apply Agile business practices in order to survive and grow in their turbulent market environments. And at the heart of Agility is SPEED - the capability of an enterprise to rapidly execute decision making and operational cycles.

The execution of the decision making process may be viewed as involving the cycling through of four distinctive but interdependent stages: 1) OBSERVATION, or absorbing information from the environment by all possible means; 2) ORIENTATION, or placing this information into a matrix of human understanding and experience; 3) DECISION, or selecting a subsequent course of action based upon the likelihood of either offensive achievement or defensive nullification; and 4) ACTION, or attempting to operationalize or carry out the previously conceived decision. Collectively, these stages have come to be known as an OODA loop, a concept created by the late USAF fighter pilot and strategist, Col. John R. Boyd (see any of the references by Richards). There is a growing body of evidence that not only armies (e.g., the allied forces in Desert Storm) but also companies (e.g., Boeing; the "new" IBM; the reengineered UNISYS; CNN) that have streamlined their decision cycles (that is, enhanced their OODA loop processing) enjoy a decisive competitive advantage. It is this OODA process which is proposed as the unifying model for the digital commerce environment and its dependence upon the many characteristics, strategies, tools and implementations of general Agility principles.

Both the concept of Agility (the ability to change maneuver states; the time derivative of maneuverability) and of OODA loop processing were conceptualized on the military battlefield. Executive-speak to the contrary, business is not war, at least not in the literal sense. Nonetheless, the competitive business marketplace does share with the military battlefield many of the same fundamental components and principles involved in warfare: determining where and how to "attack" its perceived markets; protect and grow its citizens (customer base); and overwhelm its competitor(s), as examples. Perhaps the most significant similarity, however, that businesses share with their military counterparts is that the mental aspects of conflict (that is, the rapidity and effectiveness with which an organization cycles through its OODA loops) have come to replace the physical aspects of competition (i.e., size, power and wealth) as the dominant contributor to, and determinant of, competitive success. AMAZON.COM and DELL COMPUTER are but two of a growing panoply of examples of this competitive business truth.

## AGILITY

AGILITY is commonly defined, in the business vernacular, as the ability of an organization to thrive in competitive marketplaces which are characterized by continuous, accelerated, and often unpredictable rates and types of change, and which are synonymous with the Internet, World Wide Web, and e-Commerce/e-Business environments. Unlike FLEXIBILITY, which is an enterprise's planned responsiveness to anticipated contingencies (i.e., scenario planning), Agility's objective is to minimize the resistance to change in any direction. The directions, or metrics of change that Agility encompasses, include:

A) The SPEED with which an organization is capable of instituting change B) The COST associated with incremental change C) The ROBUSTNESS or stability of the changed state D) The SCOPE or breadth of change from the initial state E) The FREQUENCY with which an organization is able to change F) The ACCURACY or correctness of the enterprise's identified change target G) The PRECISION with which an enterprise achieves its change objective

Agility is implementable in one of two strategic modes: either pro-actively (i.e., leading change; disrupting markets and competitors); or reactively (responding to change, either opportunistic or degenerative). Of these, pro-active is the preferable mode in that it places (keeps) one's competitors in a defensive and reactive operational posture, preventing them from defining the market on their own terms. This is especially significant in the e-Commerce/e-Business environment where change can, and has, instantaneously destroyed existing markets and spawned new global competitors and products.

Currently, there are three operational Agility spheres:

- A) Mass customization, or the ability of an enterprise to fragment its market (s) into ever smaller niches (even down to lot quantities of one), and to treat those niches with specialized products and services
- B) Accelerated change rate, in which change is a marketplace constant, and increasing clockspeed is an expected and predictable characteristic. This type of Agility is usually evident in, and is driven by, high tech environments.
- C) Dynamic organizational reinvention, in which an enterprise is able to rapidly transform itself by reconfiguring its management structure, business processes, and market/channel relationships in response to an unanticipated and paradigm shift-inducing opportunity or threat.

## OODA LOOPS

The study of Agile "command and control" execution starts with a simple model of the process known as the OODA loop. The OODA loop applies to any two-sided conflict, whether militaristic (where it was initially defined) or economic (where it applied in this paper). OODA, as defined above, is an acronym for Observation-Oriented-Decision-Action, and which describes the basic command-control process.

When an enterprise is engaged in conflict (as in determining how to lead, or respond to, a competitive change initiative, e.g., drive a market; blunt a competitor's strategic thrust; employ a new technology; etc.), its first activity is to OBSERVE the situation - that is, to take in raw and unprocessed data about its own status, its marketplace, its customers, its competitors, its partners, regulators, channels and operational environment. Sometimes an enterprise actively seeks that information (in today's jargon, "pulls" information): sometimes that information is thrust ("pushed") upon it. In the Internet/e-Business world, both the volume of available data, and a richness of divergent forms of that data, are available on a continuous, real-time basis.

Having OBSERVED the situation, the enterprise next ORIENTS itself - that is, performs certain analyses and makes certain estimates, assumptions and judgments about the situation in order to create a cohesive mental model or image of the total environment. In simple terms, the enterprise attempts to determine what the changing/changed situation means to it and how it will be impacted.

Based on ORIENTATION, the enterprise next DECIDES what to do - regardless of whether that decision is self-contained or involves other entities (including customers, suppliers, partners, regulators and even competitors), and whether that decision takes the form of an immediate action or involves the creation of a deliberate plan and a delayed response.

Finally, the enterprise puts its DECISION into ACTION. This includes disseminating the decision, supervising its execution, and monitoring the results of the ACTION through feedback. This completes one iteration of the OODA cycle, and returns the enterprise to the OBSERVATION phase. For having ACTED, the situation is now changed, thus initiating a new OODA cycle.

(It is worth noting that, in any organization with multiple decision requirements and multiple decision makers, multiple OODA loops may be "spinning" simultaneously and concurrently. One of Agility's objectives is to achieve enterprise integration through coordination of these multiple independent loops).

Importantly, the OODA loop process that command and control, whether centralized or decentralized, and conducted organizationally or individually, is a CONTINUOUS and cyclical process. In any competitive environment, the antagonist/enterprise that can consistently and effectively cycle through the OODA process faster - that is, can maintain a higher tempo of actions - than its competitors gains an ever-increasing advantage with each cycle. With each iteration, the slower competitor falls further and further behind and becomes increasingly unable to cope with the continuously deteriorating situation. The Japanese call this result *suki*, or the creating of discontinuities in the opponent's concentration. With each cycle, the slower competitor's actions become less relevant to the situation.

Cycling faster than one's competitors is the key to successfully managing customer relationships and competing in e-Commerce/e-Business environments, where a customer may be thousands of miles removed from a company's bricks-and-mortar facility, but where one's competitors are only a mouse click away. The applicability of OODA loop processing to Agility, and its value as the unifying model for Agile e-Commerce/e-Business enterprise design and implementation, derive from the importance that OODA looping places on the tempo of command and control. Speed is an essential element in executing effective command and control. Speed in command and control means shortening the time needed to make decisions, to plan, coordinate and communicate. OODA speed is a critical component of Agility, and especially so in environments that are large, complex, non-linear, unpredictable and continuously changing. These are the precise characteristics that mark global business competition today ... and that will only continue to intensify in the future.

Since business is competitive, it is not absolute speed that matters, but rather speed relative to one's customers and competitors. The aim is to be faster in OODA processing than one's competitor(s), and to lead or respond to challenges and opportunities within a customer's time requirements with effective, customized solutions. Focused solutions provide significantly greater customer value than is achievable through the production and delivery of commodity-type or non-customized products and services.

The speed differential does not have to be a large one: a small advantage, exploited repeatedly, can quickly lead to decisive results (e.g., the Honda-Yamaha motorcycle "war"). Continuously operating faster (that is, "within") competitors' OODA cycles places those competitors in the unenviable position of continuously reacting, rather than pro-acting, in the marketplace. As such, the potential to disrupt competitors' focus and concentration, and the subsequent deterioration of their competitiveness, are greatly enhanced.

#### **KNOWLEDGE MANAGEMENT AND CHANGE PROFICIENCY**

An Agile enterprise is a creative entity that is continuously exploring, learning, testing, innovating, implementing, measuring - in essence, an organization in a state of ongoing and perpetual proactive and reactive change. As such, it has an imperative to balance the acquisition and creation of knowledge (Knowledge Management) with its rapid application (Change Proficiency) to a constantly fluid environment. To be proficient at OODA execution means to be proficient in managing the capture and analysis of knowledge, and to be proficient in applying that knowledge effectively - whether such knowledge is of a market opportunity, a production methodology, a business practice, a product or process technology, an individual's skills, a competitor's threat, a customer's requirement, etc.

The concepts of Knowledge Management and Change Proficiency are not new. Organizations throughout time have practiced both successfully, or have ceased to exist. What IS new is the need for more formal and directed understanding and application of these practices through the formality of OODA loop processing in order to achieve world class levels of Agility. What used to be performed informally and at haphazard pace is no longer adequate in the frenetic and fragmented global e-Commerce/e-Business economy.

Balancing the two competencies of Knowledge Management and Change Proficiency within the OODA loop process is extremely important. Too much Knowledge Management leads to information overload and analytical paralysis. Too much Change Proficiency (i.e., a disproportionate focus on change without a balancing knowledge component), can easily lead to spastic and inappropriate activity.

#### **TOOLS FOR THE OODA PROCESS**

Several management science and Information Technology tools are available today to assist an enterprise in constructing and implementing an effective Agility-based OODA process. From these tools, an integrated architecture specifically designed for the change-intensive and often unpredictable e-Commerce/e-Business competitive environment has been developed.

#### **OVERALL OODA DESIGN TOOL**

In 1991, Carnegie Mellon University's Software Engineering Institute introduced a Capability Maturity Model (CMM) to provide an evolutionary framework for continuous enterprise process improvement. Initially designed to assist software organizations in developing mature software management processes, the methodology has subsequently been generalized and applied to a broad spectrum of enterprise development and enhancement processes.

The CMM employs a formal structure which organizes a process into five maturity levels, each of which lays the successive foundation for continuous process improvement. Each level consists of a set of process goals that, when satisfied, stabilize an important component of the process. Achieving a level of maturity qualifies a different component of the process, resulting in an increase in the organization's overall process capability. The five levels of CMM maturity are:

- 1) INITIAL - Few, if any formal processes, exist
- 2) REPEATABLE - Basic process management practices are established
- 3) DEFINED - Overall process is formalized and consistently deployed
- 4) MANAGED - Quality measures are developed and applied
- 5) OPTIMIZED - Continuous improvement and radical change initiatives are routinely applied

Under the sponsorship of the United States Department of Defense, Lehigh University's Agile Manufacturing Enterprise Forum (later renamed the Agility Forum), developed a variation of the CMU/SEI Capability Maturity Model. This variant, specifically designed for Agile principles and practices, is known as the Change Proficiency Maturity Model (CPMM). The CPMM applies a similar five-level architecture of increasingly Agile business practices:

- 1) ACCIDENTAL: No formal process; changes occurs on an ad hoc basis
- 2) REPEATABLE: Prior successes for the basis for "lessons learned" change
- 3) DEFINED: Formal change process initiated; change metrics employed
- 4) MANAGED: Change managers appointed; company-wide process installed
- 5) AGILE: Principle-based adaptability; conscious change engineering

The Agility-focused Change Capability Maturity Model addresses the change proficiency disciplines areas of: 1) Vision and Strategy 2) Business Case Justification 3) Innovation Management 4) Relationship Management 5) Knowledge Management 6) Performance Metrics

#### **A FORMALIZED MODEL FOR E-COMMERCE/E-BUSINESS DECISION MAKING IMPROVEMENT**

Given the complexity of today's global e-Empowered marketplace, the veritable glut of electronic data, and the unpredictable nature of competitive, technological, regulatory, financial and process change, a means of formalizing and institutionalizing enterprise decision making via the OODA loop process appears to be warranted. To this end, a model has been developed which identifies, for each of the OODA loop's individual components (Observation - Orientation - Decision -Action), a tool to facilitate and support the execution of that component's activities. Each of the tools feeds forward (and backward where feedback is involved) into the loop's subsequent (and prior) processes, creating an integrated, holistic decision-making environment.

The CMU/SEI generalized Capability Maturity Model, and the Agility Forum's Change Proficiency-specific Maturity Model, provide the bases on which the e-Commerce/e-Business maturity model has been developed. This model guides the progression of the e-Commerce/e-Business planning and management processes, and of its OODA loop design and implementation methodology, further described in this paper.

#### **'OBSERVATION' TOOL**

OODA OBSERVATION involves both the deliberate ("pull") and passive ("push") collecting of raw and unprocessed data that are of potential importance to, and impact on, the enterprise. These data encompass a breadth of disciplines, and include: the general business environment; the company itself (vision,

mission, culture, structure, values, etc.); the enterprise's market area(s); its products; its customers; suppliers; competitors (both actual and potential); employees; business partners; regulators (if any); delivery channels; business networks; process technology; and Information (computer/communications/data management) Technology.

To guide the enterprise in gathering relevant data to address the business-critical areas defined above (that is, to formalize the OODA loop's OBSERVE activity), an Agility-focused "Organizational Success Characteristics" questionnaire has been developed. The questionnaire addresses one-hundred Agility-specific business issues.

NOTE: The Organizational Success Characteristics Questionnaire draws heavily on a similar instrument that was developed several years ago by the UNISYS Corporation.

By establishing an active and continuous data gathering process that addresses all of the above-cited issues and areas, the e-based enterprise is positioned to monitor the relevant competitive business terrain and its relationship to, and position on, that terrain. This is the principal objective of the OODA loop's OBSERVE function.

#### 'ORIENTATION' TOOL

The process of OODA loop ORIENTATION is that of interpreting and determining the impact of the data acquired in the preceding OODA OBSERVATION step. A tool to assist enterprises in designing an effective ORIENTATION process is the Balanced Scorecard.

The Balanced Scorecard is an approach to strategic management that embeds the enterprise's long-term strategy into the management system through the mechanism of measurement. In contrast to traditional, financially based measurement systems, The Balanced Scorecard focuses an organization's attention on future success by setting objectives and measuring performance from several distinct, yet complementary, perspectives - all of which must be effectively and efficiently accomplished if an enterprise is to achieve and maintain a competitive and marketplace capability.

#### TRADITIONAL BALANCED SCORECARD PERSPECTIVES

Traditional Balanced Scorecard methodologies incorporate the following four perspectives:

The LEARNING AND GROWTH PERSPECTIVE directs attention to the basics of all future success - the organization's people and infrastructure. Adequate investment in these areas is critical to all long term success.

The development of a truly learning-based, Agile organization supports success in the INTERNAL PERSPECTIVE. The Internal Perspective focuses attention on the performance of the key internal processes that drive the business. Improvement in internal processes NOW is a key lead indicator of financial success in the future.

In order to translate superior processes into financial success, companies must first fulfill their customers' needs and expectations. In Agility terms, this means the providing not of dissociated products and services, but rather of integrated solutions which often are complex interrelationships of physical products, responsive service, and appropriate informational components. The CUSTOMER PERSPECTIVE considers the business through the eyes of the customer, so that the enterprise retains a central focus on customer needs and satisfaction.

The FINANCIAL PERSPECTIVE incorporates traditional measures which reflect an enterprise's achieved marketplace performance and which define the economic value that the business returns to its investors and shareholders.

#### AN AGILITY-SUPPORTIVE BALANCED SCORECARD

The Agile Balanced Scorecard methodology builds on traditional four-component Balanced Scorecard offerings by introducing and incorporating a fifth perspective, that of Agility. The AGILITY PERSPECTIVE focuses the organization's attention on its proficiency in leading and/or adapting to change. Change capability mastery is a fundamental business requirement for e-Commerce/e-Business enterprises whose competitive cycles are driven at Internet speed.

Collectively, the five Agile Balanced Scorecard perspectives provide, to the OODA ORIENTATION component, a comprehensive measurement and analysis focus that identifies the issues, meanings and impacts on the enterprise's current status, and likely future performance as an Agile, e-Commerce/e-Business entity.

#### 'DECISION' TOOL

In OODA/Agility loop processing, DECISION is the process of determining a course of action to be pursued, based upon the acquisition and interpretation of data/information/knowledge as implemented in the OODA loop's 'OO' components. In the highly competitive e-Commerce/e-Business environment, a combination of decision making speed and enriched creativity are necessary. A practicable tool has been developed in Russia to guide such a decision making process. It is known as TRIZ, the Cyrillic acronym for the "Theory of Inventive Problem Solving."

TRIZ is a mechanism that promotes creative or "out of the box" thinking about complex problems and opportunities, i.e., those for which there is no known solution, the resolution of which requires non-standard, innovative concepts and ideas. Initially developed in Russia by Genrich Altshuller of the Soviet Union's Patent Office, and subsequently refined and extended over the last fifty years+ by research scientists and practitioners throughout the world, TRIZ guides decision makers and problem solvers, in a systematic and modular manner, into non-standard thought patterns and atypical potential solution spaces.

Today, the TRIZ methodology incorporates a blending of classical (Altshuller-developed) and modern (ex-Altshuller-developed) concepts, components and tools. These include:

- 1) Ideal Final Result: Traditional problem solving methods and thought processes seek resolution through compromise, i.e., by balancing or trading off the positive and negative impacts of a potential course of action. By contrast, the Ideal Final Result describes a problem solution which has all of the benefits, none of the detriments, introduces no additional complexity and carries none of the costs of the original system.
- 2) Technical Zone of Conflict: A technical conflict is the result of a proposed solution which, in improving one characteristic of a system, causes the deterioration of another characteristic of that system. TRIZ's objective is to resolve all technical conflicts associated with a potential solution by eliminating, reducing, or not worsening the system's negative aspects while concurrently improving its positive ones.
- 3) Physical Zone of Conflict: A physical conflict occurs when Opposite, contradictory, and mutually exclusive properties are Required of the same component or characteristic of a system (i.e., a requirement exists both to increase, and to decrease, the same characteristic of a system). As with technical conflicts, TRIZ resolves physical conflicts through compromise-negating Innovative concepts and principles.
- 4) Separation Principles: Separation principles are TRIZ operators that guide conflict resolution by proposing the partitioning of a system's components and/or activities. The types of segmentation incorporated into TRIZ include:
  - A) In space
  - B) In time
  - C) Within a whole object and its parts (separation of contradictory functions)
  - D) Upon conditions
  - E) Separating a part from the whole (isolation of undesirable properties, functions, characteristics)
- 5) Contradiction Matrix and Inventive Principles: Traditional Triz's (Altshuller-developed) initial classification system for inventive problems employed a 2X2 Contradiction Matrix. The X and Y axes of this matrix contain 39 unique engineering parameters (i.e., speed, force, strength, etc.) which Altshuller determined formed the bases for all technical patents. The coordinates or intersections of these axes are represented by one or more of 40 unique operators or underlying principles (i.e., segmentation, extraction, equipotentiality, etc.) that Altshuller identified as resolving that category of technical contradiction. (For example, in addressing a conflict involving weight vs volume of a moving object, Extraction, Copying, Pneumatic or Hydraulic Construction and Composite Materials are suggested as possible solutions).
- 6) Inventive Problem Solving (IPS): Inventive Problem Solving is a TRIZ application that systematically guides individuals in solving inventive problems. It employs a five-step process that includes:

- A) Problem documentation
- B) Problem formulation
- C) Innovation direction prioritization
- D) Solution concept development
- E) Results evaluation and plan implementation

- 7) Anticipatory Failure Determination, or the identification of potential problems BEFORE they occur by systematically attempting, through directed and creative thought processes, to sabotage and render the system inoperable.
- 8) Directed Evolution, a process that assesses a system's current development stage, identifies alternative potential evolutionary vectors, and provides the basis for directed future development.
- 9) ARIZ, an algorithmic process which computerizes many of the TRIZ logical activities, resulting in an abbreviated learning period and more rapid implementation of inventive problem solutions.

Many TRIZ software tools and products have been developed, and are available in the commercial marketplace, to assist individuals in resolving problems of an engineering or technical nature. The architecture described in this paper employs TRIZ, however, in applying inventive problem solving concepts and principles to indeterminate classes and types of general strategic, tactical and operational e-Commerce/e-Business issues, opportunities, conflicts and competitive threats.

#### 'ACTION' TOOL

ACTION is the culmination of the OODA loop process. It results in the enterprise's execution of a reactive response or of a pro-active initiative. An Agile, e-Commerce/ e-Business enterprise's ACTION objective is to be unconstrained, or at worst to be minimally constrained, in its ability to conceptualize and implement change in ANY direction, regardless of whether that change is organizational, operational, technological, product or process oriented, or is some combination of these. As such, **Agility** is not only the OODA process's ACTION tool, but also the fundamental and imperative core competence for any would-be-successful global competitor whose products/services/markets/channels/relationships are characterized by continuous and/or unpredictable and rapid change.

The need for competitive **Agility** has been occasioned by two complementary forces:

- 1) The rise of the electronically wired, universally accessible and increasingly interdependent global e-Business community
- 2) The development of rapidly reconfigurable and reusable (Agile) production technologies and processes

A result of the convergence of communications and production technologies has been the deterioration of traditional markets served by traditional, hierarchically structured and mass production-focused enterprises. In their place is emerging a new business model - the ad hoc, electronically-interconnected enterprise or "virtual organization." The virtual enterprise is comprised of the temporary electronic linking, pooling and coordinating of independent enterprises' organizational units, intellectual properties, and production capabilities. It is especially effective in the emerging globally competitive e-marketplace which increasingly is characterized by specialization, fragmentation, and speed and pervasiveness of change - elements which even the largest and most resource-endowed of enterprises find themselves no longer able, on a stand-alone basis, to adequately address.

This 'virtual' capability is especially well served by the Internet and World Wide Web protocols, whose capacity for integrating services from diverse organizations is rapidly transforming the norm of business practice from competition by individual companies to competition by electronically coordinated/integrated networks of companies or "webs." Many businesses have already recognized that connectivity to the Internet, and effective exploitation of available Internet services are, and increasingly will become, major factors in their overall competitiveness, and have committed both strategies and resources to their implementation. For these forward-looking organizations, relationships with suppliers, partners and customers will soon be mediated almost exclusively using Internet/Intranet/Extranet technology ... resulting in dynamic reconfiguration and inter/intra company process integration becoming deeper, broader and more seamless than even recently believed possible. The complex inter-dynamics of this environment will place increasing demands for increasingly rapid and accurate OODA loop processing ... both for each partnering organization in the virtual enterprise, and for the virtual entity as a whole.

Over the next few years, Internet-type technology will also transform the role of the Information Technology/Information Systems department from its currently perceived function of dedicated internal support. The feasibility to deliver a greater diversity of networked services over public networks is creating opportunities for new models of how information systems are conceived, implemented and sourced. The time is rapidly approaching, through the establishment of syntactic (e.g., XML) and semantic (e.g., ontologies of vertical business areas and practices) standards, when it will be possible to create, on demand, the necessary (Agile) information infrastructure to support complex virtual enterprises, to enable their successful operation with minimal human intervention, and to dismantle them when they are no longer needed. This will be possible at various granularities:

Supporting discrete, short term activities between small teams working across enterprise boundaries - for example, collaborating on individual activities or participating in isolated business processes

Enabling a tactical response, for example at the business unit level, to repel a competitive threat or to capitalize on a market opportunity

Sustaining long term, strategic electronic commerce arrangements that deeply integrate an enterprise's core processes with its supply, demand and value chains and affinity groups - resulting in complex, multifaceted virtual businesses

RosettaNet has already facilitated the development of an electronics industry-supportive ontology for e-Commerce/e-Business facilitation. Carnegie Mellon University's Robotics Institute has created a software-driven Agile Assembly Architecture. This architecture, which incorporates standard manufacturing ontology, supports the dynamic linkage of reconfigurable/reusable intelligent manufacturing modules based on dynamic and changing market and customer demands.

#### CONCLUSION

Today, the acceleration of change in the global e-Commerce/e-Business environment is forcing organizations across a broad diversity of manufacturing, service, academic and governmental institutions to become more Agile, that is, to increase the number of iterations while decreasing the duration per-iteration of their OOD decision-action cycles. Market fragmentation, global competition, electronically mediated relationships, e-Commerce/e-Business communities, information communication efficiencies and other business trends (e.g., virtual enterprising, competitor partnering, business reengineering, etc.) are placing demands on business organizations to respond ever more quickly and adaptively to meet ever-changing market, customer, and competitive demands. Because of the central role of Information Technology in enabling and empowering the modern and Agile enterprise, which one might view as a globally wired and information intensive electronic "chameleon", increasing pressures are being placed on IT management to support accelerating business requirements for fluidity and change.

With that capability in hand, an organization has at its command the tools and processes it needs to accelerate its OODA cycling and to maintain its ongoing competitive viability in an increasingly e-Commerce/e-Business dominated world.

#### OBSERVATION PHASE:

##### AGILITY/OODA EVALUATION QUESTIONNAIRE (Based on work done by UNISYS Corporation)

The formal agile decision-making planning and management methodology is structured on the O-O-D-A (Observation - Orientation - Decision - Action) architectural model. The process begins with the comprehensive collection of data encompassing the candidate enterprise's business environment (OBSERVATION Phase). This initial agile methodology component is supported by an Agility Potential Questionnaire.

The purpose of the Agility Potential Questionnaire is twofold: 1) To focus an enterprise's OBSERVATION process on those business and technology areas of primary importance to adaptability and pro-active change management. 2) To act as a blueprint or road map in guiding an enterprise in its transformation from inagile to agile, and/or offline to online e-Commerce/e-Business competitor.

The following eight business categories, with specific question sets, are designed to focus an organization's collective intelligence gathering process in those areas that are central to rapid capture, sense, strategization, and leading or responding to unanticipated change.

Each segment of the Agility Evaluation Questionnaire begins with a visionary statement that sets the questionnaire area's general theme. Within each dimension are statements (questions) that reflect that area's Agility-competitive imperative capabilities.

For each characteristic, the enterprise is asked to rate the EXTENT to which the corresponding statement reflects its own plans, processes and capabilities. The rating is on a numeric 1-5 scale as follows:

1- Not at all 2- To a small degree 3- To a moderate degree 4- To a substantial degree 5- Pervasive and institutionalized

#### OUR ENTERPRISE

Our enterprise is an holistic, organic entity. It operates through a complex, dynamic and continuously changing network of processes, activities and tasks that must constantly be reconfigured, integrated and aligned.

- 1) We have a vision that is formally defined and published, and which our employees understand, articulate and internalize. (1-5)
- 2) Our vision is constantly reviewed for, and modified as appropriate to reflect, our response to, or leadership of, change. (1-5)
- 3) Our mission, goals and objectives are aligned and integrated throughout all levels of the enterprise. (1-5)
- 4) We have a management team that leads from the front and influences by example. (1-5)
- 5) We are insanely customer focused. We strive to outdo our competitors by providing customer-solution products, services and information. (1-5)
- 6) We are constantly vigilant and driven. We continuously strive to exceed our best past performance. (1-5)
- 7) We are sensitive to accelerating time pressures and demands. We strive to continuously shorten our management and operational cycles. (1-5)
- 8) We have defined and understand our core business and support processes, and how they work and interrelate. (1-5)
- 9) Management encourages and rewards innovation and risk-taking. (1-5)
- 10) Our management actively encourages and employs creative, innovative "out-of-the-box" thinking. (1-5)
- 11) Our enterprise can anticipate and respond to new competitive threats and market opportunities with agility. (1-5)
- 12) Our enterprise is able to rapidly reconfigure its management structures and operational processes to both lead, and to respond to, unanticipated change. (1-5)
- 13) We understand the AGILITY imperative and pursue it through mass customization, accelerated change rates, and market-redefining paradigm shifts. (1-5)
- 14) We understand the benefits that result from making decisions more rapidly and effectively than our competitors, and aggressively pursue this strategy. (1-5)
- 15) Our customer-facing and back office processes are fully integrated and inter-operational. (1-5)
- 16) We focus our energies in improving speed and effectiveness in everything we do. (1-5)

#### OUR CUSTOMERS

The customer is the lifeblood of our enterprise. He/she is the only reason why we exist. If we create solutions for our customers, they will purchase, and use, our products, our services and our information.

- 1) We know who our customers and our potential, but non-customers, are. (1-5)
- 2) We know and understand how and why our customers use our products, services and information. (1-5)
- 3) We value customer retention and actively seek new ways to attract and retain customers. (1-5)
- 4) We understand the heightened competitiveness and customer fluidity of the digital commerce marketplace, and constantly enhance our customer relationships with aggressive customer-focused product, service and information initiatives. (1-5)
- 5) We listen to, but especially we observe, analyze and interpret our customers' behavior. (1-5)
- 6) We view our customers' complaints as opportunities both to learn and to improve. (1-5)
- 7) We continuously search out new ways for customers to communicate with us. (1-5)
- 8) We employ both physical and electronic channels to connect with, and to serve our customers. (1-5)
- 9) We actively employ Internet/Extranet technologies in our customer relationship interactions. (1-5)
- 10) We supply our customers with solutions, which are combinations of products, services and information. (1-5)
- 11) We customize our products, services, and information offerings on an individual customer basis. (1-5)
- 12) We strive to make each customer a lifetime customer. (1-5)
- 13) We understand that, to be effective in the digital commerce marketplace, we must educate and lead our customers. (1-5)

#### OUR PEOPLE

Our people are the source of our organization's strength: its structure, operations and its ideas. Our people embody the culture and personality that define our enterprise to our customers and the broader marketplace.

- 1) We value our people as our most important resource. (1-5)
- 2) We understand that, in the digital commerce marketplace, our employee's intellectual properties are more valuable than our physical products. (1-5)
- 3) We provide an environment that fosters creativity, innovation and non-traditional thinking. (1-5)
- 4) We lead, encourage and inspire our employees through example. (1-5)
- 5) We do not punish failure; instead, we encourage creative exploration and treat failure as a learning and growth opportunity. (1-5)
- 6) We empower our people with authority and responsibility across the entire enterprise. (1-5)
- 7) We enable our people with state-of-the-art tools and information resources. (1-5)
- 8) We employ cross-functional teams to increase the effectiveness of the solutions we deliver to our customers. (1-5)
- 9) We have a minimum of organizational structure and rigidity. (1-5)
- 10) Our organization is AGILE; we can quickly and effectively restructure to the changing needs of the marketplace and exploit all potentially

profitable marketplace opportunities. (1-5)

11) Our employees understand the role in the organization and their criticality to our, and our customers', success. (1-5)

12) Our people are flexible and adaptable to continuously changing business and technological environments, opportunities and challenges. (1-5)

13) Employees decide, and have access to, all the information they need to perform their jobs. (1-5)

14) We ensure that our employees maintain their personal fulfillment and professional employability through a balanced program of developmental education and skills training. (1-5)

#### OUR COMPETITORS

Our competitors keep us vigilant and alert. We value and respect their presence in the markets and industries in which we compete.

1) We know our industry and use strategies that influence our competitive leadership and supremacy. (1-5)

2) We identify, capture and analyze our competitors' strengths, weaknesses, opportunities they provide and threats they represent. (1-5)

3) We constantly monitor our industry and our competitors' activities. (1-5)

4) We constantly monitor other industries and areas of potential competitive threat or opportunity. (1-5)

5) We know why our customers are attracted to our competitors. (1-5)

6) We constantly strive to differentiate ourselves from our competitors. (1-5)

7) We partner with our competitors when it makes business sense to do so. (1-5)

8) Today we have competitors that until recently we were not aware of. (1-5)

9) Today we have competitors that until recently we viewed as non-threatening. (1-5)

10) Today we have competitors that until recently did not exist. (1-5)

11) We are able to rapidly sense the shifting boundaries of our industry. (1-5)

#### OUR MARKETS

In the digital commerce environment, new and unanticipated markets are emerging every day. If we do not constantly and aggressively seek out and create new markets for our products and services, existing or new competitors will displace us.

1) We are sensitive to local customs, preferences and cultures of our customers and their environments. (1-5)

2) We know the markets we serve well. (1-5)

3) We know the markets we do not serve well. (1-5)

4) We are aware of new and emerging markets that we could serve in the future. (1-5)

5) We know how to rapidly create new markets for our products/services/ information. (1-5)

6) We have created new markets where none previously existed. (1-5)

7) Our competitors have created new markets before we have. (1-5)

8) We are dominant in our markets: we define the marketplace and introduce change. (1-5)

9) We are continuously scanning the marketplace for information about potential new opportunities or competitive threats. (1-5)

10) We use modern management modeling and simulation tools to better understand the marketplace and our position in it. (1-5)

#### OUR BUSINESS NETWORK

Our business network is comprised of a coordinated web of customers, suppliers and distribution networks. Integrating them into one value system is a potentially powerful source of market supremacy.

1) We respond to the market by integrating our customers, suppliers, distributors and other business partners into an extended enterprise. (1-5)

2) Increasingly we are creating extended enterprises through the use of portals, vortals, exchanges, or other electronic marketplaces and networks.

3) We employ virtual enterprise principles and practices by joining, and exiting, dynamically formed and disbanded business networks based upon market opportunity or competitive threat. (1-5)

4) Increasingly, our business is conducted through Internet-enabled electronic supply and demand chains. (1-5)

5) We understand and apply a diversity of "new commerce" business models in our digital commerce initiatives. (1-5)

6) We share information openly. We trust our business partners and strive to maximize the potential of each cooperative initiative. (1-5)

7) Our business networks are structured around a mutually beneficial relationship. (1-5)

8) We recognize that, in the e-Business marketplace, we cannot compete alone. We therefore employ business partnering and network relationships as strategies of choice. (1-5)

9) We partner with others in our business network both to capitalize on market opportunities and to repel mutual competitive threats. (1-5)

10) Our business networks use standard interchange protocols and industry standard information syntax and semantics to connect, navigate and manage our shared information assets. (1-5)

#### OUR USE OF SCIENCE AND TECHNOLOGY

Industry is rapidly moving away from separate products to business solutions embodying a combination of physical product, service, and information. As we transition into the "embedded information" solution environment, greater emphasis is being placed on the role of science and technology. Today we compete in a marketplace of "smart" products, "smart" communications networks, and knowledge-enabled employees.

1) We constantly invest in new ways to apply science and technology to develop new, and to improve existing, products, services and information. (1-5)

2) We form strategic relationships with science and technology partners when appropriate. (1-5)

3) We have in place an Information Technology strategy to support an information management strategy and action plan. (1-5)

4) We use technology as an enabler, not as a driver, of change. (1-5)

5) We understand both the positive and negative potential impacts of emerging production and information technologies and management sciences on our business. (1-5)

- 6) We employ Expert Systems to elevate and enhance the performance and effectiveness of our decisions and our employees. (1-5)
- 7) We have in place both Information Technology and process technology architectures and infrastructures that are adaptable to changing market, competitive and technological conditions. (1-5)
- 8) Increasingly, we are employing digital commerce technologies to achieve our strategic business strategies and goals. (1-5)
- 9) Our products and services increasingly are technology-dependent or are technology-based. (1-5)
- 10) We value innovation as our primary sustainable competitive weapon and actively nurture technology-enabled change. (1-5)

#### OUR MANAGEMENT OF INFORMATION

The enterprise's ability to rapidly identify, capture, disseminate and apply a diversity of strategic and operational information has become the dominant factor in determining its competitive effectiveness. It is the component that underlies all of our processes, relationships, activities and structures.

- 1) We have in place a business strategy that places a premium on intellectual capital. (1-5)
- 2) We have in place an information management plan that identifies the strategic use of information to improve our competitive advantage in the marketplace. (1-5)
- 3) We have in place an information management plan that is adaptable to constantly changing market and technological conditions. (1-5)
- 4) We adhere to industry standards and best practices for managing information. (1-5)
- 5) Our people, our customers, and our business partners have access to our corporate information resources, with appropriate levels of security and constraint, in the performance of their business functions. (1-5)
- 6) Every employee in our organization has access to all the information he/she requires to perform the job most effectively and efficiently. (1-5)
- 7) We employ modern Information Technology management tools to capture, analyze, transform and apply information. (1-5)
- 8) We have in place facilities and tools to capture all customer contact (touch point) information. (1-5)
- 9) We provide our employees a comprehensive set of tools for navigating, manipulating, managing and applying our information resources. (1-5)
- 10) We provide our employees, customers and business partners with the capability and incentive to access and update information that relates to them. (1-5)
- 11) We understand the Internet's information value. We have the facilities and tools in place to efficiently and effectively access external information. (1-5)
- 12) We understand that, regardless of the products and services that we provide, and the markets and customer we serve, we are in the information business. (1-5)
- 13) We have a knowledge management framework for capturing and applying employees' information, experiences, capabilities, issues and ideas that might otherwise be lost. (1-5)
- 14) We are measurement-focused. We have in place a formal enterprise performance measurement system, which tracks both hard and soft, leading and trailing performance indicators. (1-5)
- 15) We continuously monitor and interpret our business intelligence and performance data, and use those data as inputs to our strategic, tactical and operational initiatives. (1-5)
- 16) We are rapidly becoming a knowledge-based company. (1-5)

#### ORIENTATION PHASE:

##### THE AGILE BALANCED SCORECARD

The second component of the Agile/OODA planning and management methodology addresses the ORIENTATION element of the OODA decision-making loop. ORIENTATION is the process of processing the data accumulated in the prior OBSERVATION phase through a matrix of human understanding and experience. The purpose of this phase of the OODA process is to develop a comprehensive mental model of the potential or actual OBSERVED data on the enterprise ... that is, to determine what the body of accumulated observations means to the organization. To support this activity, the Agile/OODA management methodology employs The Balanced Scorecard model.

The Balanced Scorecard is a set of financial and non-financial measures that relate to an enterprise's critical success factors. What differentiates this methodology from other performance measurement systems is that it combines, in a single document, both financial measures of past performance (lagging indicators) and non-financial measures of the drivers of future performance (leading indicators).

The specific objectives and measures of an organization's Balanced Scorecard are derived from the enterprise's vision and strategy. Vision describes the enterprise's ultimate goal. Strategy defines the means through which that goal is to be achieved.

Each industry, and each enterprise within that industry, is unique, and therefore requires a different set of strategies, goals and objectives to achieve its vision. There is general agreement, however, that the framework for a "traditional" Balanced Scorecard will include the following four perspectives:

**THE FINANCIAL PERSPECTIVE:** The Financial Perspective is based upon the following question: "To succeed financially, what kinds of financial performance should we provide to our investors?" It reflects the concern of for-profit enterprises that every action should be part of a cause-and-effect relationship that culminates in improving both short-term and long-term financial performance.

**THE CUSTOMER PERSPECTIVE:** The Customer Perspective is based upon the following question: "To achieve our vision, how should we be seen by our customers?" Enterprises need to identify the customer and market segments in which they choose to compete. The Customer Perspective provides the mechanism for organizations to align their measures of customer values (i.e., loyalty, retention, profitability, acquisition, satisfaction, contribution, etc.) with strategically identified and targeted customer and market segments.

**THE INTERNAL BUSINESS PERSPECTIVE:** The Internal Business Perspective addresses the question of: "To satisfy our shareholders, customers, and other business partners, at what internal business processes must we excel?" Internal business processes are the vehicles through which products, services and information are created and delivered to the enterprise's customer, shareholder and other business partner communities. This component expands traditional focus beyond improving existing operating processes to define a complete internal process value chain that includes the identification (reactive and pro-active) of current and future customer needs, and the creating of solutions to fulfill those (reactive/pro-active) needs. It is at the heart of an enterprise's ability to develop those solutions that provide the greatest perceived value to its customers.

**THE LEARNING AND GROWTH PERSPECTIVE:** The Learning and Growth Perspective focuses an organization's attention on the following question: "To achieve our vision, how will we sustain our ability to change and to improve?" Based on the objectives established in the Financial, Customer and Internal Business Perspectives, An enterprise must identify supportive objectives and measures to drive continuous organizational learning and growth. The objectives of the Learning and Growth Perspective should compel an enterprise towards successfully achieving its financial, customer and internal process goals.

The above four perspectives represent a material improvement over prior mono-dimensional, exclusively financial management reporting systems. This is especially true for traditional and offline enterprises. Internet-enabled, digital commerce markets, however, are characterized by a new business paradigm of accelerating clock rates, increasing unpredictability, and continuous change. In this competitive milieu, success is largely determined by an enterprise's competency both in its adaptability to, and in its leadership of, change.

**THE AGILITY PERSPECTIVE:** To emphasize the e-Commerce/e-Business imperative for organizational fluidity, the methodology introduces and incorporates

an Agility Perspective. Agility is alternatively defined as "the minimization of the inhibition to change in any direction."

Agility defines an enterprise's capability to both lead (pro-active) and to respond (reactive) to unanticipated competitive, technological, regulatory, customer expectation-driven, etc. change. It is more than learning and growth. In terms of Balanced Scorecard principles, AGILITY defines the enterprise's change capability proficiency in its Internal, Customer, Financial and Learning and Growth Perspectives. It focuses intra-organizational attention on the following question: "In order to remain competitively viable, how do we build adaptability into, and operate agilely across, our total business architecture?"

The Agility Perspective serves as the focus for the enterprise's pro-active and reactive change management adaptability quotient. The perspective reflects the imperative that Internet-enabled e-Commerce/e-Business enterprises, whether they be bricks-and mortar, bricks-and-clicks, carve out/spinoff, or .Com, MUST evolve to, that is, to incorporate enterprise-wide fluidity in their organizational structures, internal and external processes, business relationships, and product and service offerings.

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#### DECISION PHASE:

##### TRIZ (THEORY OF INVENTIVE PROBLEM SOLVING)

The third component of the Agility/OODA planning and management methodology addresses the DECISION element of the OODA loop. DECISION is the process of formulating a course of action based upon the interpretation of information analyzed in the preceding ORIENTATION Phase. To support this activity, the Agility/OODA methodology employs concepts and principles derived from Ideation International Incorporated's TRIZ methodology.

TRIZ represents a new and innovative thought paradigm for systematically addressing and resolving 'INVENTIVE' problems, i.e., those for which the application of standard or known practices is inadequate to solve. Such problems contain a fundamental contradiction in which either mutually exclusive demands are made of some component of the system (e.g., a hypersonic aircraft wing must have both broad surface for lift, and narrow surface for speed), or in which the improvement of one characteristic of the system (e.g., increasing product strength) simultaneously degrades another characteristic of the system (e.g., increases weight).

Traditionally, such contradictions have been resolved by trade-off or compromise. TRIZ, however, seeks to achieve "ideality" by eliminating the contradiction WITHOUT compromise.

TRIZ was initially developed in the Soviet Union. Its acronym stands for the Russian phrase: "The Theory of Inventive Problem Solving."

TRIZ is based on the principle that most "new" problems contain key elements that already have been resolved - possibly in a completely different context and in a different industry for a totally unrelated situation. As such, TRIZ provides a mechanism for effective problem resolution, regardless of the specific area or industry in which the analogous solution was developed. its structured methodology provides the vehicle for innovation in product and process design, and in problem solution derivation.

Three principal TRIZ components are employed in the Agility/OODA management methodology:

**INVENTIVE PROBLEM SOLVING (I.P.S.):** Inventive Problem Solving encompasses the creative identification, definition and resolution of complex problems and issues in existing and planned systems. Traditional problem resolution processes focus on accepting the defined problem as-is, and on rapid narrowing and isolation of that problem's potential solution space. TRIZ, however, stimulates identification of the "true" problem before expanding and enriching the potential resolution space and guiding the user to one or more possible analogical solutions.

As such, I.P.S. is a methodological construct for reaching across disciplines to solve problems using solutions from other areas of technology or business.

In OODA LOOP decision terms, I.P.S. provides, for both offline and Internet-enabled e-Commerce/e-Business competitors, an Agile mechanism for the rapid development of creative solutions for complex and unpredictable threats and opportunities.

**ANTICIPATORY FAILURE DETERMINATION (A.F.D.):** Anticipatory Failure Determination supports the systematic anticipation, identification, location and diagnosis of potential failures in planned systems. This method, in effect, invents failure mechanisms and then examines the possibilities of their actually occurring. The system designer wishing to identify and eliminate potential solution failures before they occur engages in reverse thinking: he or she becomes a "saboteur," systematically testing how to wreck the system in the most efficient way.

In OODA loop DECISION terms, A.F.D. provides the means to rapidly determine both the quality/robustness, and the potential weaknesses, if any, of an identified pro-active or reactive "real world" or virtual, digital commerce initiative.

**DIRECTED EVOLUTION (D.E.):** The Directed Evolution process is designed to support the prediction and active management of the evolution of next-generation products and services. In essence, this method foresees the future of a product or process by actually inventing it. The system's current maturity state is analyzed, and alternative conceptual designs or technologies for next-generation products/processes are defined.

In OODA loop DECISION terms, Directed Evolution provides the mechanism for stockpiling follow-on products, processes and services in anticipation of competitors' reactive or pro-active strategic initiatives.

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#### ACTION PHASE:

##### Agility

The final component of the Agility/OODA planning and management methodology addresses the ACTION element of the OODA loop. ACTION is the process of operationalizing the decision(s) taken in the preceding DECISION phase.

Agility is about both speed and fluidity of adaptation to/leadership of unanticipated change. It has been defined as minimizing the inhibition to change in any direction.

The constantly accelerating pace of change has substantive implications for what a company has to do to become, or to remain, competitively viable in the globally wired, Internet-enabled e-Commerce/e-Business marketplace. Profit opportunities have become more fleeting as more (specialized) products have been introduced into the marketplace. At the same time, products must now be increasingly customized and differentiated from one another, not only in the enterprise's highly fragmented home markets, but also when companies enter global markets and encounter national differences and preferences.

Thus, a company must become increasingly adept ... not to mention quick ... in its ability to continuously adjust to changing markets, products, technologies, customer expectations, competitors, government regulations, etc, and which markets are increasingly transitory, contested, complex and heterogeneous. The enterprise must also become materially more precise and creative in how it competes and in what it delivers. This change phenomenon results in perpetual morphology.

Agility's principal OODA impact occurs in both the DECISION (unrestricted potential course(s) of action) and ACTION (unconstrained ability to execute the selected decisions) phases. To achieve these results, the enterprise must be constructed as a network of reusable and reconfigurable organizational, technological and process components.

In general, Agile Enterprises possess the ability to rapidly reconfigure their internal and external business processes, operations, organizational structures, technology architectures, and business relationships to both lead, and to respond to, market opportunities and competitive threats.

The Agility/OODA architecture, the foundation of which is established during the implementation of the Agility Evaluation Questionnaire, provides the vehicle both to create the Agile Enterprise, and to execute whatever course of Agile action has been determined. This could include, but is not limited to, the following:

Partnering with a competitor  
Joining a web (business network), exchange or other digital marketplace  
Becoming a member of a Virtual Enterprise  
Integrating internally (front and back office processes)  
Mass customizing solutions (down to lot quantities of one)  
Accelerating internal and external change rates  
Creating a new business paradigm  
Replacing products with solutions

ACTION is the culmination of one OODA loop iteration. It also marks the beginning of the next for, having ACTED, the business environment is now changed. This necessitates OBSERVING the changed environment and initiating additional iterations through the OODA loop stages.

As marketplace change is both inevitable, pervasive and continuous, so is the enterprise's need to remain constantly vigilant and Agile. The Agile/OODA management process establishes the discipline for realization.

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