

**An
 Object Theory
 of
*The Financial Firm***

The Ten-Year Platform

A Field of Schemes

If you build it, they will come.

The World in Twos

The Tao of Wall Street Systems

Wall Street Systems are very conservatively controlled. The instruments may be wild and crazy, but it is difficult to stray far from the existing processing systems. Despite this strong momentum of existing systems, adaptation occurs. That is, new functionality does get added--so long as it replicates the touched parts in the system used for control. This is continuous systems development. No big projects. Just a list of job jar tasks. Along the way, the critical path reveals itself. At any point in carrying out a task, there is the expected but unpredictable hold-up. And so it goes: It happens. We handle it. The Tao engineer remembers what works through building kits of specialty tools to assist maintenance, modification and documentation of what is done. This is the "It" of controllable new systems: The Tao of Wall Street Systems.



Used Happens	Control
New Happens	Adapt
It Happens	Cope



The World in Threes

There are three points of view :

I. The Executive Monograph

Tools of theContract

General understanding of the central role of Contract and how it constructs the Firm. The concepts of the Process toolkit which supports modeling Contact objects of Attributes and Messages and the Responsibilities and Collaborations among Contract objects. A few working tutorial examples. 175pp

II. Information Engineering Principles

Tolls of the Infrastructure

Technical design approach to providing the trans-holistic enterprise Environment of the Global Information Network (theEnGINE). The guidelines for use, situational analyses for application of the Principles with relative costs of options. Appendix with Tutorial on a Document Library System. 300pp

III. System Development Guide

Toils of Technology

Implementation details for constructing systems. The toolkit, a detailed tutorial exposition of its use with documentation including reference, message list and knowledge base system. Appendix with three KBS interfaces to the system KB: (1) GUI (Client), (2) the API (Server Agent), and (3) the IPC (Server). 500pp

The topics covered in each book are (A) *Financial Markets: A Pure Information Business*, (B) *System Development: Long-Term Strategy through Short-Term Deliverables*, and (C) *Knowledge Tools: A Portfolio of Packaged Technologies*. Each volume's role is to concentrate primarily on one topic: The Executive Monograph on Financial Markets, the System Development Guide on Strategy, and the Information Engineering Principles on Knowledge Tools.



A. Financial Markets: *A Pure Information Business*

*How we perceive what is.
The windmills and waterwheels of the collective consciousness.*

The information about money is more valuable than the money itself. (1985)
The World is on an Information Standard. (1992)

Walter Wriston

In the early 1980's, Walter B. Wriston, the former chairman of Citicorp, envisioned Citi as a global powerhouse in five businesses: Institutional Banking, Individual Banking, Investment Banking, Insurance and Information. Today, he sits on the board of Reuters International, the largest provider of business information in the world (with Rupert Murdoch and, previously, the late Robert Maxwell). His 1992 book, ***The Twilight of Sovereignty: How the Information Revolution is Transforming our World***, tells of how sovereign nations no longer control their own currencies. This is because of world-wide foreign exchange traders with their market data video displays through which they trade on a daily basis, equivalently, \$800 Billion to \$1 Trillion of all currencies. Twenty-four hours a day, seven days a week. He asserts the new source of wealth is the production and distribution of information, not goods. Knowledge is the key-- a case of mind over matter. World commerce is not on a gold standard, nor a dollar standard, nor a mark standard, nor a yen standard. Information is not the exclusive property of governments nor is it constrained by political borders. The **World** economy now runs on the **Information Standard**, serving all and controlled by none but all.

The end of this century ushers in the next millennium. With it begins the full realization of Walter's World. So what is the prudent person to do to avoid financial impoverishment, let alone create wealth in this world? The function of money and wealth have not changed, just the form of their creation and conservation. The ultraconservative person needs an old magnetic mattress or a trusted electronic sock to hold valued knowledge. (Actually, the CD player and CD library may be just the thing.)

Information is the new currency and Knowledge is the new wealth. Walter's World is accessible to anyone. (Orders of magnitude more so than with the currently perceived order of human affairs.) The capital needed to **create, acquire, store** and **present** information and knowledge is less than \$3,000. The average car costs over \$15,000. And it can only get you to and from work, not serve as your office as well. The barrier to entry into the Financial Markets of Walter's World is limited only by some basic skills, the will to participate and minimal marketing.

But what is information? What is knowledge? These questions have been on people's lips since the dawn of recorded history and probably at the birth of language itself. The 10,000 clay cuneiform tablets from ancient Sumeria (3300 BCE) archived at the University of Pennsylvania Museum are concerned almost entirely with financial transactions (exchange of livestock, deeds, etc.) and instructions on how to compute. The remainder contain either recordings of celestial observations or recountings of popular myths. The power of the tablet is well known to those of Judeo-Christian persuasion. Moses and his two tablets displaced the Golden Calf as Law. Just as the Sumerians dug clay from the fertile Mesopotamian flood plain, so too did the Egyptians pound papyrus sheets from reeds along the Nile. The key was the endless, low-cost supply of the medium of the specie. Hieroglyphics recount the exploits and wealth of the great pharaohs as well as their religious stories and methods of planting, harvesting, building, mapping the earth and charting the heavens. The Chinese invented paper money in the 14th Century and the Italians created bills of exchange in the 15th Century. The Chinese also invented gun powder and clocks which were more sources of amusement than tools of war and industry.

Each of these old civilizations, which flourished longer than ours, recorded all the same classes of things which we do. The next millennium will just use different media. Yet we will still deal with information and knowledge on planting, harvesting, building, mapping the earth and charting the heavens, as well as with finance and religion.. People have always needed and will always need sustenance, sociality and sex. Human affairs are concerned with funding and fulfilling these needs. And so, information and knowledge about these affairs will be at the bottom of all markets. Numbers, computers and global communication media are the means by which information and knowledge will be **created, acquired, stored and presented.**



Some sell artificial intelligence. I prefer natural wisdom.

The first impression of the **New Information Standard** is that,

- (1) **information** derives from **data + meaning (program, process, behavior)**,
- (2) **knowledge** results from **information + context (event, state, point-of-view)**, and,
- (3) **wisdom** comes from **knowledge + action (purpose, choice, human values)**.

The global change towards the information/knowledge economy is of mythic proportion. Therefore we can see the emerging events in the market place and competing entities as stage and actor in plays with the new mythical themes. But what is the primordial matter? Is it not **symbolic form**? Symbols, whether chips in stone, impressions in clay, ink on paper, arsenic in silicon or light on aluminum, are the fabric of **information**. Ernest Cassirer published a three volume treatise on Language and Thought in 1924. The second volume of ***The Philosophy of Symbolic Forms, Mythical Thought***, is introduced with a point which sets the background of this discussion:

"... In the relation between myth and history myth proves to be the primary, history the second and derived factor. It is not by its history that the mythology of a nation is determined but, conversely, its history is determined by its mythology--or rather, the mythology of a people does not determine but is its fate, its destiny as decreed from the very beginning."

Our current scientific way of viewing Nature (Physics, Chemistry and Biology) provides the equations from which truths of the new information and knowledge market place are derived. It is our new myths which create the generative equations of the revealed truths, the human dimension. This corpus of revealed truths can be defined as **wisdom**. Several pages later in his introduction, Cassirer counterposes the worlds of myth and **knowledge**:

"The mythical world is and remains a world of mere representations--but in its content, its mere material, the world of knowledge is nothing else. We arrive at the scientific concept of nature not by apprehending its absolute archetype, the transcendent object behind our representations, but by discovering in them and through them *the rules determining their order and sequence*. (emphasis mine)"

Walter's World is interactions within the Global Village and its rules determining their order and sequence. Where is the culture which binds us together? Who is the Shaman to provide spiritual guidance? How does privacy (and lack thereof) affect behavior? We get unity through diversity. What role do myths play in creating universal images? The answer to these questions is in the icons of people, the iconography of framing their communication. This is the rhythm and rhyme of humanity which engenders the tenor of public and private life.

There are no new ideas. And this assertion is a very old idea itself. We can discover the essential character of people by studying the oldest of inscriptions from the birth of writing. These are fossil records from which we can deduce much of early culture. But the early clay tablets retrieved from the Babylonian archives provide a very objective body of knowledge about a highly developed civilization.

Mesopotamia was the birthplace of writing. What did people first record? The cuneiform tablets in the Penn Museum show the transactions of everyday life as well as the myths and legends. One could argue that the creation of wealth derived from the efficiency of commerce derived from accurate and objective record keeping. The time to reflect on and record myths and legends derives directly from surplus value. But from a market demand view, people wanted and responded to these myths. These myths were transmitted by oral tradition before the advent of writing. They were evoked by images and symbols. Dreams come from the depths of image memory. Language contains the words, phrases, idioms which attempt to convey the images. Oral tradition almost always uses an icon to evoke the image around which the myth/legend is communicated. Image is universal, language culturally specific.

In modern information processing, a universal sign language is the Holy Grail of systems to communicate symbols, icons and images. This is why graphical user interfaces have taken over the presentation of systems. This is why there are so many of them. Where is the Rosetta Stone to allow us to translate among the plethora of graphical interfaces to our information resources?



Just On Time

Time is too slow for those who wait, too swift for those who fear.

The Present is a frontier of events between The Past and The Future

The Past is an ever expanding museum of events.

The Future is a bottomless wellspring of events.



The Numbers of the Beast



Number and curve (time series) are the central elements for representing market information.

The Wall Street appetite for numbers is insatiable. At the end of the day, the winners are those with the best numbers, the largest volume of transactions, the fairest pricing of exotic financial instruments, the highest return on investment. This is why the "Rocket Scientist" took over as the prima donnas of trading, creators of new markets. Those facile with formulas can develop the new more efficient, proprietary methods of valuation for old and new instruments alike. Differential and integral calculus are the angel Metatron, overseer of the throne of the Queen of the Sciences, Mathematics.

Numbers allow development of increasing precision in the measurement of market forces, interest rates and returns on the differentiated assets. Success is determined not by absolutes in the financial markets, but by relative performance against competitors. As markets become more competitive, margins shrink. As margins shrink, smaller absolute differences in performances become relatively larger as a percentage against competition. So, there is significant advantage in knowing the next decimal place of a number with greater certainty.

Precision has its price, however. To develop a number to another decimal place, which has one tenth the numerical value of the previous place, often requires ten times the effort. It is worthwhile if it yields a positive advantage. When the values are in the billions, small advantages yield significant profits. The precision is in two forms-- (1) in the value for a price or size and (2) in the certainty of the value. For example, the price of an IBM common share is predicted in two months hence to be 48 1/2 within a range of plus or minus 1 point. In the calculation of the value of an option on 100 shares of IBM, both the price of the underlying instrument, the IBM common share, and the volatility, the price range of the IBM share, contribute heavily in the formula. Thus, more precision in the price or more precision in the volatility (increase in certainty) can yield a fairer price and, therefore, more predictably, expectations of profitable transactions.



"Cogito ergo sum." ("I think therefore I am.") Rene Descartes, 1596-1650, (Rene of the Maps), inventor of analytic geometry which gave equational precision to the plane and solid geometries.

"Cogito ergo est." ("I think therefore it is.") David Sherr, 1944-, on the laterday version of Descartes' observation on the generative capacity of thought. This is a Post-Rationalist approach in the use of models to create systems. (Sherr also said, "I would have been on the philosophy team, but I flunked the metaphysical.")

"Credo ergo est." (I believe therefore it is.) Sara Solovitz, 1953-, in response to Sherr's comment above. This captures the essence of financial markets. If enough people say *"Credo*

ergo est." then the market exists. The conveyance of belief lies in the comprehensibility of the models of the instruments of finance.

"Money is an abstraction." Adam Sherr, 1969-, commented during a one-year stint at a Seven-Eleven having made several hundred thousand dollars in change. "It's a new world, Dad." was another retort when asked about why kids preferred TV to books, electronics to carpentry. Electronic Images are the *lingua franca* of The New World.

The information about money is the key to understanding the New Finance of Walter's World which has been upon us for almost 40 years since the invention of Quotron, a real-time video display of stock quotes. What is credible about money and it's functioning? The invention of money is what made commerce abstract. Barter is very concrete. Two bags of wheat for one bag of corn. One cow for three sheep. Medieval pegging of the pound and the franc was not to gold, but to one sheep! When copper was in short supply, small bags of wheat were used as specie. Hence the use of the term "bread" for money. This may not be true, but it is surely believable--the Post-Rationalist criteria for existence.

What is believable information about money? Where can we begin in modeling The Financial World? What is the structure and the dynamics of Financial Entities and their Functions on the exchange of Assets and Liabilities in the Capital Markets?



Since this is all so abstract, it will be presented around four main characters and a supporting cast in an updated *Vanity Fair* (apologies to William Makepeace Thackeray, 1811-63). Each character is archetype for a concept domain. We can visualize and understand the model of finance as a set of relationships among people.

Think of it as a myth of money or the fairy-tale of finance.

Cassirer has a salient comment on myth which captures the nature of doing this object theory of the firm as a mythical process:

"... From the beginning of myth, particularly every magical view of the world, is permeated by the belief in the objective character and objective force of the sign. Word magic, image magic and writing magic are the basic elements of magical activity and the magical view of the world."

Arthur Clarke provides the tag ending to this point, "New technology is indistinguishable from magic." The aim here is not to demystify the magic, but to elaborate the role of mystery, magic and authority in the creation of this model of the world.



The World in Twos and Threes.

An Object Theory of the Firm

The Dimensions to Entities in the Financial World are four-fold:

1. theObligation: Dynamics or what makes it go in the first place. (The Ginsburg View: thanks to Stanley Ginsburg for setting me straight one November morning on the commuter train to NY).

thePrincess, the divine sovereign, who has the vision and is the ultimate authority.

Her color: Obligation (Type, Discharge, Possession, Duration)

2. theAsset: Mechanics or how does everything interact at the detailed level. (The Sherr View: derived from building a position keeping system for an Equity Block Trading Desk).

theCaptain, the executor/enforcer, who organizes the ventures and protects the kingdom from unwelcomed incursions.

His spin: Asset (Type, Quantity, Cost), Flow (From, To, Where),
Contingency (Condition, Price, Likelihood), FinancialEvent (C, A, F, When)

3. theCounterparty: Equilibrium or how does the whole ball of wax keep from melting down (The Rosner View: adapted from several discussions on counterparty with Joel Rosner, one of many colleagues in building a master architecture for Lehman Brothers trading systems).

the Sorceress, the magic maker, who can balance seemingly unwieldy objects or defy gravity by floating very heavy objects with no visible means of support.

Her charm: Counterparty (FinancialEntity, Market, Risk)

4. theTime: Certainty or what sets the rhythm and cadence for the entire mechanism which has no absolutes and in which nothing is known with total clarity even past events (The Landes View: developed from David A. Landes' *A Revolution in Time*, and adapted from Hawking's *A Brief History of Time* and John Boslough's *Masters of Time*).

the Jester, the prankster/punster, who keeps everybody honest and loose by speaking the truth with impunity and defuses pressure situations with an off-the-wall remark.

His strangeness: Time (Base Clock, Precision, Accuracy)

In modern terms of physics (rocket science) theFinancialEntity is a space-time continuum; and it participates in its own con(de)struction! Mathematically, it is a three dimensional space (tO X tA X tC) interacting through time (tT).

FinancialEntities come in four flavors, not necessarily distinct: (1) those which trade assets for others on a daily basis (Intermediaries), (2) those which manage assets for others (Institutions), (3) those which create and issue those assets (Issuers), and (4) those which underwrite securities and advise Entities (Investment Banks). These business models address only the point-of-view of theFirm. They do not attempt to describe Financial Entities like an individual investor or an automobile production company, for example, although such a company has a significant financial operation which issues financial instruments like CARS, bonds backed by receivables (assets) from car loans. This is the domain of the Investment Banker whose success is due largely to a network of personal relationships and to the ingenuity to present asset issuance, corporate restructurings, and, financial engineering.



The World in Twos and Threes

The Process of Trading

Traders do not act in real-time. The world around them operates in real-time. They monitor it and respond to significant events with prescribed sets of actions. Their actions and the external actions define real-time. It is a Tao thing. They act as fast as they can act. And so, they are not directly paced by external events. They are actuated, not controlled, by real-time events. These events trigger the sequences of actions which may in turn trigger other internal and external actions by precipitating further events.

Capital Markets
Trading

The Process of Sales

Capital Markets
Sales



The Process of Investment Banking

Investment Banking



The Glossary of Concepts

Held Asset Accounting Definition

A collection of future cash flows to an entity, control of those flows by the entity and a probability that the flows will occur.

Contigent Asset Flow

The Financial World is a domain of Asset holding Entities whose positions change based on a network of Obligations among Counterparties which determines the contingencies upon which Assets flow between and among the Counterparties. All Assets can be approximated as a linear combination of Contigent Asset Flows.

Asset Cost

The cost of an asset is the totality of cash and cash-equivalents which have flowed out to maintain hold upon it.

Measures

Return on Assets at Risk

The net cash flow per annum per unit of value for those assets funding a Book of Business, at risk being the extent of expected loss of the funding assets.

Allocated Capital

Those assets dedicated to the funding of a Book of Business..

Cost of Carry

Cost of financing the funding assets of a Book of Business.

Market Share

Percent of cash flow through a Book of Business from a defined exchange of assets among all FinancialEntities of interest.

Profitability

The percent of net income to total revenues against a Book of Business.

Market Definition

To define a Market one needs the dynamic information for an Asset: Price, Liquidity, Risk.

Market Valuation Behavior

The Market values short-term assets at a premium to long-term assets. Uncertainty is usually under-valued. In general, there are sets of assumptions, Scenarios, which need to be monitored for truth.

Fundamental Profile

theFundamentalProfile is structural information about aFinancialEntity, like the performance outlook for a stock. It contains (1) theSummary, (2) theData, (3) theStatistics, (4) theConclusions.

theStatistics

α -- alpha: theFunction
 β -- beta: theCorrelation
 δ -- delta: theDifferential
 γ -- gamma: theAccelerationOfChange
 θ -- theta: theTimeValueOfPrice
 ν -- vega: theVarianceOfPrice
 ρ -- rho: theRateOfReturn



Laws of Financial Markets

- I. Risk is conserved.
- II. Margins decrease.
- III. Deals happen.

theTimeValue

tT.value of a finite contingency goes to zero. ($\theta \rightarrow 0$)



N-Scenario Theory

Market positioning involves managing several concurrent Scenarios for events. There are eight types of **S-P-E-A-K-I-N-G** dimensions used in effecting definition and control of Scenarios (after Peter Farb, *Word Play*, 1973):

Setting and Scene

Participants

Ends

Action Sequence

Key Color

Instrumentality

Norms

Genres

Think of N-Scenario Management as concurrent conversations of a FinancialEntity with its respective Niche Markets. The natural question at this point is "How do we mechanize this?" Therein lies the mystery, magic and authority. The attempt here is to provide a run at the Methods of **S-P-E-A-K-I-N-G** with the Market of choice.



B. System Development: *Long-Term Strategy through Short-Term Deliverables*

Strategy derived from actions is more a matter of intuition than plan. (1987)

Managers in the continuously innovative corporation direct by example. (1990)

Stanley M. Davis



Architecture is the technology of Strategy.

Strategy for an Organization in the Knowledge/Information Age
theSceptre

There is no long-term competitive advantage for the information and knowledge-driven organization. The barriers to entry into an information business are no longer prohibitive. Most markets will have boutique-like specialists who compete fiercely in their niche. The distinction between producer and consumer is blurred. Advantage can only be gained and held through systems which support: (1) flexible boundaries to the organization, (2) easy, but controlled access to and from the organization from and to its markets and (3) increasing speed and capacity of consumption and production of information.

Definition of Architecture

Architecture is a taxonomical framework of technical possibilities which enables and channels functional capability. It is best rendered through Images with Visual Cues to support Scenario construction and evaluation.

Positive Visualization and Architecture

Action and Attitude-- Effect: Do what it is; the immediate. Affect: Act what it can be; the situation.

Models, Image and Music

Smullyan, Itten and Baroque: Mind, Eye and Hand

Network supercedes Database supercedes Processor supercedes Memory

Bachman and Codd meet Einstein. It was only a matter of Time.

Hands-On Management

De riguer for managers of the 90's: Teachers, not generals. Schools, not armies.

New Managerial Imperative

Create environment where connections are possible. In chaos, stay the course. Achievement is faster and easier due to reduced resistance by the Organization.

Type O Personality

Be a universal donor to Type A and Type B people.

Unknowability of the Critical Path

The Critical Path is a real-time concept, not a path that can be known in advance without a great deal of uncertainty. That is, the Critical Path reveals itself as a series of single Events which realize a Plan of Action.

Technology Hedge

A Plan of Action to assure the current System does not suffer if a Technology falls short on performance.

The Art of Anonymity

The power to cloak one's participation in effecting results.

Structural Component Design Principle

Each piece is simple, i.e., does one thing in a well-defined comprehensible fashion.

The Schutzer Acceptance Principle

Better is the enemy of Good Enough

Cregan's Dictum

Every choice involves risk.

The Flow: Build, Deploy, Maintain Systems

Reliable (InfoAccess Event), Robust (Error Event), Maintainable (Service Event). Actions flow from expected InfoAccess Events, unexpected Error Events and historical Service Events. Two triage criteria define three states of Service: (1) Function not available $< t_1$ (acceptable Service), (2) $t_1 < \text{Function not available} < t_2$ (discontinuous Service) and (3) Function not available $> t_2$ (disconnected Service). Event is defined as the pair (subject, text).

Historical logs are central to servicability

Clio the muse of History has as her icons trumpet, water and clock.

C. Knowledge Tools: *A Portfolio of Packaged Functions*

An art can only be learned in the workshops of those who earn their bread by it.

Reason betrays men into the drawing of hard and fast lines, and to the defining by language--language being like the sun, which rears and then scorches.

Samuel Butler, *Erewhon*, 1872

... You see, gentlemen, reason is an excellent thing, there's no disputing that, but reason is nothing but reason and satisfies only the rational side of man's nature, while will is a manifestation of the whole life, that is, of the whole human life including reason and all the impulses. ... Reason only knows what it has succeeded in learning ... and human nature acts as a whole, ...

Fyodor Dostoyevsky, *Notes from the Underground*, 1864

As in the earliest days were our mechanics, such today are our engineers, who may be required not only to tear down a fortress, and then to build it up again, but also to produce all sorts of engines based on mechanical principles, and with equal ease to defend or to annihilate a fortress. Moreover he must invent many sorts of useful engines to lighten work; and he must often render a thing feasible that has appeared to be impossible.

Jakob Leupold, *Theatrum Machinorum*, 1725

*Art is in the details.
God is in the details.
The demon is in the details.*



Technology creates context, not content.

The Process Toolkit: Contract, Attribute, Message

Packaged Functions in a Toolkit

Installation Tool, UI Builder Tool, Management Tool, Documentation Tool

Each Function of theEnGINE of Contracts has (1) a delivery mechanism, the Installation Tool, (2) a creation/maintenance capability, the UI Builder Tool, (3) a run-time monitor/logging utility, the Management Tool, and a knowledge rendering utility, the Documentation Tool.

Package the Legacy

Create the concepts, techniques and processes that are bequeathed to the new Architecture. Legacy is not a burden, but the point of departure to the new. Legacy is an active component in the creation of new systems.

The Compleat Business Application Toolkit.

The information environment and the portfolio of packaged functions which manipulate a business operation like Equity Trading. For example, the essential Front-Office Trading functions are Position Keeping, Trade Entry, Order Management. The essential Back Office functions of Clearance are part of the environment. These include Delivery, Payment, Record, Inventory. The essential Market Data functions are part of the environment as well. These include Quote Page, Ticker, Price Feed, News Page, Market Monitor, News Feed.

The Law of the Network

Transparency of a Distributed Application is directly proportional to Network bandwidth.

If an Application operates as if the Net were not present, then the limiting factor becomes the speed of replicating shared context to all Participants. In short, the ideal is for any aspect of Organization (Enterprise) to look the same regardless of the Node or Subnet within which the Application operates. This idea is conveyed by Indra's Net within the Buddhist cosmology. The cosmos consists of a Net of Pearls which simultaneously reflect the exact same things. A dot placed on one Pearl instantly appears on all others so that the original is indistinguishable from any of the others.

Sunderland's Law

Books are basic. Aggregation is primitive.

A Book of Business is a set of Contracts which requires Capital to fund it and is measured for Risk, Return and Profitability. Aggregation is by Legal Entity, Product, Geography and Time.

Business Policy and Rule Toolkit

Subscription to key transactional events and the raising of out-of-tolerance events. Handlers of first, second and last resort. The tagged message: (subject, text), transport and alerts use the entMsgBus.

