

# Information Technology and Business in the Post .COM World

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The impact of the World Wide Web on the world of business has been dramatic. No commercial venture is taken seriously if it does not have a URL prominently displayed in its advertisement or .com in its name. This might lead one to believe that the relationship between technology and business is one in which technology drives business evolution. The situation is a good deal more complex. Examples of the artifacts created by the complex feedback loop between technology and business range from the development of clay tablets for the durable storage of tax records in the Assyrian empire, to the birth of electronic commerce over 100 years ago supported by stock tickers and telegraphy. In this talk, Mr. Tyson will explore the relationship between a variety of business and information technology artifacts of more recent vintage, including the development of the Middle Office in financial services and the concomitant rise of n-tier distributed computing, and explore how current developments in the business environment may impact the development of software architectures in the near term future.

Kevin Tyson is currently Chief Information Officer at Netfolio Inc. He has more than 25 years of experience building mission-critical information systems for financial services organizations. He has designed and programmed systems for funds transfer, equities, fixed-income and derivatives trading, settlement, clearance, and compliance operations. Mr. Tyson has been an active participant in the Financial Domain Task Force and Architecture Board of the Object Management Group. He is also a member of the Association for Computing Machinery and participated in several Program Committees for the OOPSLA and EDOC conferences.

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As such, the compliance guy wishes me to inform you of the following:

## Introduction

- Who am I?
  - Financial Services Software Developer
  - Chief Information Officer at Netfolio Inc
- What do I hope to accomplish in this talk?
  - Elucidate the relationship between Information Technology and Business using Financial Services as the exemplar for all “Business”

When Doug invited me to give this talk I jumped at the opportunity. I saw it as a chance to give something back to the OOPSLA community from which I have gained so much over the years. However, two concerns came to mind. As we are all aware, as software developers we are standing on the shoulders of giants, some of whom you have heard from this stage and in invited talks at previous OOPSLA conferences. Guy Steele’s presentation on language design comes to mind. Unlike many of these giants, I am not a researcher, or at least for me, computer science research is a hobby rather than a vocation. To make matters worse, I am the product of the New York City Public School System and hence, I have learned most of what I know on the street. In the case of computer science, what little I know I learned on Wall Street.

So my first concern was, “What could I share that you’d find valuable?”

My second concern stems from some invited talks I’ve attended in the past that were presented by fellow denizens of the commercial world and turned out to be little more than plugs for a firm’s products or services.

My response to the first concern is motivated by two incidents I observed at recent OOPSLA conferences. The first was a comment made during the Project Manager Dating Game when Kent Beck, speaking in character said, “How will you motivate me?” Kent said this based upon his personal experience developing software. The response from the audience indicated that this was a shared experience. Coming from a financial services background, this is not an experience I share. In fact, when he said it, the strains of a particular song started running through my mind. I’m sure you all know it. Some of you may know it as a Ray Charles tune, others as a Beatles song, for me the definitive cover was by the Flying Lizards. “The best things in life are free, but you can give to the birds and bees, I want money.” Although I am a running dog of the bourgeoisie, I’m aware that we have to have balanced lives and money is only part of it. I just find it quite sad if you look to your employer motivation.

The second incident occurred at last year’s educators symposium. During the portion I attended, some people with dot EDU email domains, students, expressed a desire for a more vocational approach to their education so that they could fill the swelling ranks of java programmers employed by Internet startups. Others with dot EDU email domains, faculty, expressed a desire to align curriculums with the needs of industry without necessarily becoming the farm league for Internet startups. Still others with dot EDU domains, somehow representing industry, waxed eloquent on the need for a classical computer science education as a prerequisite for success at an internet startup.

These led me to direct the main thrust of this presentation towards the relationship between business and IT. A formidable undertaking indeed! Business people are not held in high regard. (NY State Transportation Bond Issue Story). This is not the first time I’ve attempted this. A few years ago, in conjunction with my colleague and mentor Haim Kilov, we presented an information model the US Secondary Mortgage Market to a group of computer science researchers at an OMG event in Cambridge England. The results were disappointing, noses broken as people lost consciousness and collapsed on their desks, others swallowed their tongues and still others needed to be defibrillated. And this particular market is small, self contained and fairly easy to understand! To address this problem, I have broadened the scope and drawn specific examples from my current endeavor, Netfolio.

Which runs smack into my second concern. Although I will be speaking of my work at Netfolio, I want to insure you that I am not here with the intention of getting any of you to become customers. If you are one of the people in our target market then it is up to our marketing department to hunt you down where you live and present a compelling business proposition. I am also not here recruiting. If, after this talk, you are interested in career opportunities at Netfolio then hunt us down where we live and present us with a compelling business proposition.

And now let us proceed.

## My Viewpoint

- The corner of Broad Street and Wall Street is the center of the known universe
- The price mechanism of market economies is the most efficient information processing system yet devised
- The Capital Markets business has had a tremendous impact on the development of information technology and will continue to do so in the future

As you are all aware, those who know do, those who don't teach and those that can do neither consult. Having consulted for many years I can reveal trick #3 of the consultants handbook. Keep your viewpoint implicit and prescriptive. This helps maintain a bar to entry into the field and keeps the client thinking you're a genius. At the risk of having my consultants card removed, I'm going to make my viewpoint explicit and admit that it makes sense to me and that's as close to being the TRUTH as it gets.

## Overview

- Business History
- Financial Basics
- IT History
- The Netfolio Experience
- Conclusion

## Broad and Wall

- The Center of New York's Financial District
- Early 1600s
  - Dutch invent modern capitalism
    - Selling short
    - Bear raids
    - Syndicates
    - Corner
  - 1636 Tulip.Com bubble bursts
  - Dutch settle Nieuw Amsterdam

Selling short – selling a stock you don't own in hopes the price will fall.

Bear raids – insiders conspire to sell a stock short until outsiders sell out their holdings allowing insiders to close their shorts profitably

Syndicates – a group manipulates a stock price by buying and selling among themselves

Corner – a person or syndicate secretly acquires the entire floating supply of a commodity so they can set the price

Prior to the Dutch many of the basic concepts first appear in Renaissance Italy, but the Dutch, particularly the Amsetrdamers were the real innovators.

Tulip speculation started in the early 1600s. Speculation is when financial transactions are initiated NOT with the expectation of a change in the inherent value of something but merely in anticipation of price changes. (Greater Fool Theory of Investing)

In 1635 some Tulip varieties were selling for 1615 florins at a time when a team for four oxen cost 480 florins and 1000 pounds of cheese cost 120 florins. A year latter one variety sold for over 5000 florins per bulb.

Nieuw Amsterdam was quite different than other colonies. The Puritans of New England, the Quakers of Pennsylvania and the Catholics of Maryland all established colonies to worship God as they chose. The Dutch came to make money. And this is a very good thing. When Peter Stuyvesant, a pious member of the Dutch Reform Church, tried to expel the Jews and Quakers from Nieuw Amsterdam, the Dutch West India company, the firm created to found the colony, told him in no uncertain terms to mind his own business so that the Jews and Quakers could tend to theirs.

## Broad and Wall

- English rule and English laws added to the mix in 1664
- 1666 Wampum market cornered by Frederick Philipse
  - Ends wampum inflation
- 1694 Bank of England founded
- Slave and Fur Trade continue as principal commodities into the 18<sup>th</sup> century

Fur trade was the heart of commerce at the time. Gold and Silver were worthless to the Indians. They preferred real money : wampum. Wampum were tubular shells of freshwater clams.

In 1650, 6 white beads were worth 1/20<sup>th</sup> of a guilder. Then inflation set in.

In 1659, 16 white beads were worth 1/20<sup>th</sup> of a guilder.

Governor Stuyvesant tried to fix the problem using the time honored government method of price controls with the usual results. Frederick Philipse cornered the market, took the wampum out of circulation and by 1666 they were back to 16 white beads being worth 1/20<sup>th</sup> of a guilder.

## Broad and Wall

- 18<sup>th</sup> Century
  - Banking continues to be prohibited in British Colonies so:
    - Bank of England banknotes not found in colonies
    - Wampum, foreign coins, paper money and tobacco warehouse receipts serve as money
    - Spanish Reales cut into eighths were the most common coins
      - Quarter == Two Bits
      - NYSE prices quoted in eighths

## Broad and Wall

- 1791
  - First major IPO in US, Bank of the United States
- 1792
  - Stock Exchange Office 22 Wall Street
  - Buttonwood Agreement 68 Wall Street
  - Panic caused by speculation in Treasury Securities
- 1799
  - Aaron Burr founds the water company known today as Chase Manhattan Bank

BUS IPO sold out in one hour and set off the first major Bull Market in the US

Stock Exchange Office and Buttonwood Agreement were basically price fixing cartels similar to OPEC. The Stock Exchange Office failed because people would attend to get price information and then undercut those prices down the block.

NYSE traces its roots to the Buttonwood Agreement.

1792 Panic. Speculation in bank stocks and subsequent collapse resulted in \$5,000,000 in losses to speculators.

Chase just bought J. P. Morgan & co.

## Broad and Wall

- Canal.com
  - 1825 Erie Canal opens and starts canal boom
  - Numerous other canal projects are easily funded despite numerous engineering and commercial difficulties
  - Questionable securities practices in Baltimore and Philadelphia which are prohibited in New York drive more business to New York brokers
- 1835
  - Canal.com bubble bursts

Erie Canal funded with \$7,000,000 loan at a time when the federal budget was \$22,000,000. This caused a tremendous increase in commerce in NYC and a concomitant increase in brokerage activity. Much of this activity was funded and controlled by London bankers such as Baring Brothers. In 1833 a member of Congress said jokingly, "the barometer of the American money market hangs up at the stock exchange in London."

## Broad and Wall

- Railroad.com
  - 1829 Manchester and Liverpool Railroad starts operation
  - Railroads created the first truly integrated markets
  - Railroads lead to new financing environment
  - By 1860 railroad securities account for 1/3 of all American securities
  - Numerous Boom-Bust cycles

- 1829 George Stephenson open the Manchester and Liverpool Railroad
  - 1830 Baltimore and Ohio converts to steam power
- Railroads created the first truly integrated markets. Before railroads wheat had to be consumed within 200 miles from where it was grown due to the expense of cartage. Railroads created a market in which wheat from the Great Plains competed with wheat from Russia and India
- By decreasing the cost of cartage the size of markets were increased which made possible economies of scale in manufacturing. This destroyed the efficiency of hand manufactured goods.
- They also induced a new level of political chicanery. The Erie Railroad was created for political rather than economic reasons.
  - Palliative to voters in Southern New York State to get them to support Erie Canal bond issue
  - Capitalized at \$10,000,000
  - Restricted to a route entirely within New York State and not connect with any out-of-state railroad (connections mandated in 1850 by same clowns)
  - None standard gauge specified to impeded interconnection
  - Route selected by politicians with consulting engineers proved quite difficult and ended up costing \$23,500,000
  - Increased costs resulted in textbook example of how not to fund a railroad.

## Broad and Wall

- Telegraph.com
  - 1844 Magnetic Telegraph Company formed
  - 1850s Western Union starts consolidating market
  - Telegraph Lines + Railroad rights of way = cheaper telegraphy and safer trains
  - Information + Communication + Capital = New York becomes the financial capital of US

- Magnetic Telegraph Company pays first dividend in 1846
- Long-distance communication was second only to overland transportation as a limiting factor in the pre-industrial economy.
- News could take a week to get from Boston to New York
- It was even possible to outrun the news. Brokers in Philadelphia feared the arrival of a stagecoach full of Wall streeters as they were in exclusive possession of important news from London. Such information could be used to make a small fortune

## Broad and Wall

- The rise of anti-patterns
  - Anti-Semitism
    - 1893 Jews banned from the Union League Club
    - Rise of Kuhn, Loeb; Goldman Sachs and Lehman brothers leads J. P. Morgan to declare his house and Baring Brothers to be the last protestant houses on the street
  - Borrow-destroy-borrow
    - WWI
    - WWII
  - The depression

•The consolidation of Germany led to greater freedom for Jews than almost anywhere else in Europe. Jews were allowed to vote, own land and practice the professions including finance. This led to a new form of anti-Semitism one that was social and racial rather than religious in nature, as opposed to the old medieval anti-Semitism which was based upon religion. The term anti-Semitism appeared in the English language only in 1881.

•The NY Times commented on the banning in context of the club's powerful influence in the Republican Party by noting that "this unfortunate incident would never have been allowed to happen in a year when a campaign fund was to be raised."

•Jewish bankers were accused of harboring pro-German sentiments, Henry Goldman spoke openly of his admiration of Prussia. The reality was that they were anti-Russian. Jacob Schiff of Kuhn Loeb helped finance the Japanese during the Russo-Japanese war.

•When the British sought to raise \$500,000,000 in loans Schiff insisted that none of the money go to Russia, this resulted in his exclusion from the syndicate and a blow to the prestige and profitability of Kuhn Loeb.

•Henry Goldman was forced to resign when it appeared that London would blacklist GS for his pro-German position.

•Things have improved immensely. Muriel Siebert became the first woman to own a seat on the NYSE in 1967. In 1970 Joseph L. Searles III became the first black person to own a seat.

•Problems still remain. Sandy Weil, the CEO of CitiGroup recently revealed that he felt that his attempt to acquire J. P. Morgan & Co. in 1995 was thwarted because JPM's board would not tolerate a Jew at the helm.

## Overview

- Business History
- Financial Basics
- Contemporary IT/Business History
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## Business—The Basics

- There is Stuff
- And People who need Stuff
- The problem we are trying to solve is  
People • Desire for Stuff > Existing  
Stuff
- This is where the price mechanism of  
market economies becomes central to  
information processing

## Business—The Basics

- Asset
- Liability
- Equity
- Balance Sheet
- Revenue
- Expense
- Net Income
- Income Statement

## Asset

- Anything having commercial or exchange value (economic resources)
- Subtypes include:
  - Capital Asset
  - Current Asset
  - Fixed Asset
  - Intangible Asset

## Liability

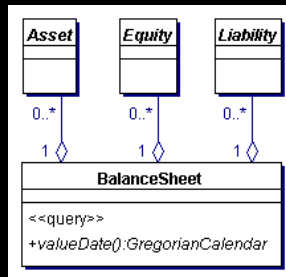
- Claim on assets excluding ownership
- Transfer of assets at a specified or determinable time
- No discretion to avoid the transfer
- Obligation results from an event that occurs before the liability exists

## Equity

- Ownership interest possessed by shareholders in a cooperation
- Equity Financing
  - Raising money by issuing (preferred or common) stock

## Balance Sheet

- Financial report showing the status of a company's assets, liabilities and owners' equity at a given moment of time (Occurrent)



An occurrent is in a state of flux that prevents it from being recognized by a stable set of attributes. Instead, it can only be identified by its location in some region of space-time.

## Revenue

- A source of income that normally arises from the sale of goods or services that the company is in business to sell and is recorded when it is earned
  - When Amazon sells a book the sale would be recorded as revenue
  - When The Travelers insurance company sold their Health Insurance business it was recorded as revenue

## Expenses

- Costs that are incurred by a business over a specified period of time to generate the revenues earned during that same period of time
  - The cost of software developers is an expense for Netfolio
  - Unusual expenses, e.g. when I accelerate my ThinkPad to 32 feet per second per second, is considered a “loss” (Onetime, or incidental transaction)

## Net Income

- Revenue minus Expenses over the same period of time
- Positive net income indicates a profit
- Negative net income indicates a “.COM” company (net loss)

## Assets versus Expenses

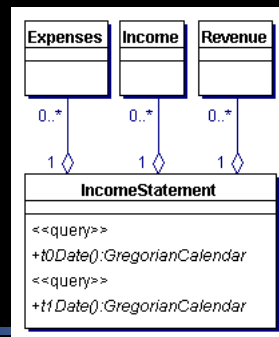
- Assets
  - An expenditure that provides future economic benefit to the company
- Expenses
  - Relate only to the current period of time
- In the Antebellum South slaves were assets but Irishmen were expenses

The last bullet contains a very important slight of hand. It contains the sort of intellectual error that we, as software developers, are wont to make. It conflates things, in this case people, with the representation of some of their abstract properties, in this case the accounting entries used to represent them. It is akin to the way practioners of Condomble, Santaria and other forms of voodoo manipulate symbols with the intention of directly affecting reality.

In this specific case, it had far reaching affects. One doesn't send an asset to do an expense's job and hence, when you needed someone to use explosives to remove a tree stump or excavate a mine. You sent an Irishmen. If you used that Irishman up, you just went down to the docks and get another one. You were only out one days pay. If you use up a slave, you've exhausted an asset. Generally, you don't want to exhaust an asset until it is fully depreciated. The far reaching effects of this economic arrangement are that Irishmen participate in the building trades to a much greater extent than the descendents of African slaves.

## Income Statement

- Results of operations of a business over a specified period of time (continuant)
- Composed of Revenue, Expenses and Net Income



A continuant has stable attributes or characteristics that enable its various appearances at different times to be recognized as the same individual

## Intermediate Conclusion

- The basic foundations of finance are quite old
- Much of the current behavior in financial markets has been seen before
- Technology has played a key role from the very beginning in a complex relationship with business

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## Information Technology

- Predates what we think of as “technology” by several thousand years
  - Writing
  - Computation
  - Communication

## Writing

- 6,000 years ago, the Sumerians started recording inventories of taxes, land, grain, cattle, slaves, gold, etc.
- Media was clay tables
- Scribes were the mechanism
- Records were durable and presented state in the context of time

## Computation

- Double Entry Bookkeeping was developed by a Roman Catholic Monk in the 16<sup>th</sup> century and has remained largely unchanged despite
  - [McCarthy's REA Framework](#)
  - [Ralph Johnson's REA Framework and patterns](#)

McCarthy's REA Framework

<http://www.msu.edu/~mccarth4/>

Ralph Johnson's REA Framework and patterns

<http://jeffsutherland.org/oops1a98/nakamura.html>

## Communication

- Capital markets have always relied on communication for competitive advantage
  - Ships
  - Stagecoach
  - Semaphore
  - Telegraph
  - Telephone
  - Internetworking

- Price information and orders have been carried by telegraph since the mid 1800s. Isn't this e-Commerce?
- SWIFT deployed the first distributed object application in 1970 (<http://www.swift.com>)

## The Evolving Structure of Businesses

- Joint Stock Companies
  - Corporations
  - Value Added Communities
  - Meta-Markets
- Time
- ~16<sup>th</sup> Century
  - ~18<sup>th</sup> Century
  - Today
- 

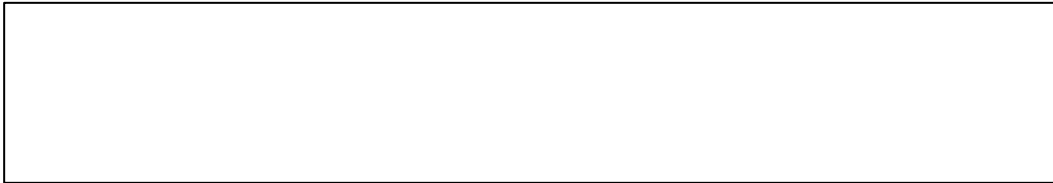


## Evolution of Corporate Business Structures

- Front office/back office
  - Line of business primary organizing force
  - Sales/processing
  - Sales makes commitments
  - Processing makes the “donuts”
- Middle office ~1990
  - Integration of multiple lines of business
  - Goal is to answer question “who’s on first?”
    - What is the state of the business at the present moment
  - Enable cross product sales

## Concomitant Evolution of Software Architectures

- Business
  - Single Office
  - Front Office/Back Office
  - Middle Office
- Technology
  - Hollerith Cards Processing
  - Mechanical and Electronic Calculators
  - Client/Server
  - Distributed Objects



## Composition of Businesses

- Markets within Markets
  - 1970s–1980s
    - Capitalist External Interfaces
    - Feudal Internal Interfaces
  - 1980s–1990s
    - IT Reformation
    - Capitalist External Interfaces
    - Mercantile Internal Interfaces
- Correction of 1987 marks crucial transition between the two

The market downturn in 1987 had a cathartic affect on capital markets businesses. Knowledge of technology became more highly valued than knowledge of business. The people that just knew business as business were dismissed, excuse me, I meant to say right-sized. Many so-called business people today are in reality technologists whose skills could not support their compensation levels but who were quite familiar with the existing technology artifacts from previous automation efforts.

BPR == Big People Reduction

## Continued Evolution

- Impact of Web as Disruptive Technology
  - Supply Chain/ERP
  - E-Commerce
  - E-Financial Services
- Adaptable Business — Adaptable Technology
  - Meta-Capitalism meets XP plus Agents



## Meta-Capitalism

- De-capitalized Brand Owning Companies
- Value Added Communities
- Meta-Markets
- eXtreme Business (XB)
  - Embrace Change

•Meta-Capitalism is a collection of concepts developed by Grady Means and David Schneider of PWC. I find it more appropriate than 19<sup>th</sup> century concepts like e-commerce

•VAC is a low-capital brand owner operating in close cooperation with an outsourced network. CISCO is the prime example.

•Meta-Markets are contiguous VACs. These are only on the drawing board and are evolving as a result of regulatory pressure, I.e., there is little to distinguish a VAC from a Trust of 100 years ago.

## Dynamics of Change

- Stovepipe businesses
- Stovepipe systems
- Today's need for change
- Greasing the skids of change
- Finding opportunities for disruptive technology

## Things I've Learned at OOPSLA

- The importance of precision in specification
- The importance of abstraction
- The importance of separation of concerns
- The importance of levels of abstraction in the integration of concerns
- Signatures are **never** enough
- Duke Ellington was wrong
  - If it sounds good it is **NOT** necessarily good

## Specification-What Can We Talk About?

- Whereof we cannot speak, thereof we must remain silent.
  - Ludwig Wittgenstein Tractatus Logico-Philosophicus
- “Really, now you ask me,” said Alice, very much confused, “I don’t think—”  
“Then you shouldn’t talk,” said the Hatter.
  - Lewis Carroll Alice’s Adventures in Wonderland

Wovon man nicht sprechen kann, davon muß man schweigen.

## Abstraction

- Helps manage conceptual baggage
  - Just the facts Madame
- Abstraction is not the inverse of precision
- Requires explicit and precise statement of viewpoint
- “Try to think abstractly – try not to think like a programmer” [J. Wing](#)

Hints to Specifiers - Author: Jeannette M. Wing.  
<http://www.cs.cmu.edu/afs/cs.cmu.edu/project/venari/www/education.html>

## Separation of Concerns

- Structure versus Behavior
  - Inheritance anomaly
- Representation versus Meaning
  - Integers ( $\mathbb{Z}$ ) versus 32 bit two-complement integer arithmetic
- Business versus Technology versus Business of Technology

## Levels of Abstraction

- Within a single level of abstraction all of the statements we can make are composed from the same alphabet and the variables have the same meaning
- When we cross levels of abstraction we must define the way in which observations at one level correspond to observations at another level (linking invariant)

The most clear and comprehensible material on this subject can be found in Tony Hoare's paper Mathematical Models for Computer Science.

(<ftp://ftp.comlab.ox.ac.uk/pub/Documents/techpapers/Tony.Hoare/mathmodl.ps>)

The ISO Reference Model for Open Distributed Processing defines an entire architecture framework that features levels of abstraction as a central property. It defines reference and conformance points at interfaces and the sorts of statements that can be made relating the two that define conformance of an implementation to a specification. Contrast this with UML.

## Signatures are never enough

- $f(\text{double}, \text{double}) \Rightarrow \text{double}$  means what?
- Giving  $f$  a more meaningful name like `fluglemarp` helps as long as everyone agrees what `fluglemarp` means
- It is necessary to augment signature with behavior specification

Assertions are the only mechanism I've experienced that works.

If it sounds good it is **NOT**  
necessarily good

C++

I'm glad to see that OOPSLA still stands for  
Object Oriented Programming in the Smalltalk Language with  
Applications ☺

## The Consequence of These Lessons

- Every utterance of a business stakeholder is not a business specification
- Developers should not use "business rule" synonymously with "problem domain constraints I can't be bothered to understand"

When a business stakeholder urinates in the sand, it is not necessarily a business specification. This is a problem that I have helped create in conjunction with others that have focused on requirements engineering to the point that some business stakeholders feel that their work is are on par with Picasso.

A great object oriented program that is readable, maintainable, extensible and adaptable is only great if it manifestly supports something in the business. By way of example, 1992 I wrote a class library for handling currencies. I wrote it in C++ and despite that fact it was beautiful. I have been a fan of literate programming for some time and this source code reflected that. Each nuance of the C++ type system that I exploited was painstakingly and meticulously documented. The MAKEFILE supported a variety of operating systems. The first users of this class library were in another part of the bank I consulted to at the time. Their manager, a gentleman by the name of Evan Tso, called me a few days after I shipped the code. Evan, in addition to being an experienced software development manager holds an MBA from the London School of Economics. He had two messages. The first was that his team was so impressed by the quality of my code that he wanted me to join his team immediately. The second was that the code was useless because it did not reflect any of the business semantics of foreign exchange or currency conversion.

## Consequences

- Business stakeholders should specify business models in terms of things, facts, rules and events
- Developers should specify behavior with assertions
- UML can be used to capture both levels of abstraction
- People can relate the two levels of abstraction

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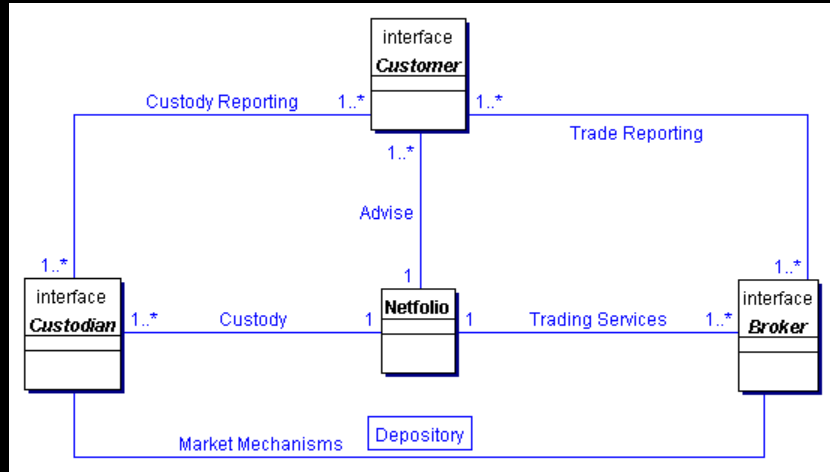
## Netfolio As Example of Disruptive Technology

- New investing paradigm invented by Jim O' Shaughnessy
  - "Personal fund" as opposed to mutual fund
    - More control
    - Greater transparency
    - Tax aware/tax advantaged
  - Power tools for investing like the big boys
    - Research ≠ Research

Mr. Warren Buffett: "The average obstetrician adds something of value for his or her client. Most people would rather have a baby delivered by an obstetrician rather than just picking someone at random off the street. The average dentist does the same thing. As does the average plumber.

"The average (investment) manager adds nothing. He subtracts something from your performance. It's almost unique among professions -- that the performance of the profession in aggregate takes something off the table and causes the clientele to get a worse result than they would if there were no professionals at all."

# Netfolio



## Netfolio Lessons

- Synergies between quantitative marketing and quantitative research call out for a full adaptive federated Agent Architecture
  - Must include people **AND** software
- There are NO green field applications in capital markets

By Full adaptive federated agent architecture I mean in particular goal directed adaptive agents.

You may have seen the add for the ebroker that touts its automation by showing a manual process for handling orders. Boy do I have news for you! There is a firm you may have heard of called ADP. They are primarily known for their payroll services. They also have a significant role in back office processing in the US securities markets. The last major change to their technology was ten years ago when we went from t+5 to t+3 settlement cycles (explain settlement). A while back in our development efforts, we had to interface to them. Due to the haste with which we were developing we could not wait until the VPN was in place so they offered us dial access to their settlement systems which would provide us with, I am NOT making this up, VSAM EBCIDIC files. I asked my lead DBA if SQL\*Loader could handle EBCIDIC. He asked what EBCIDIC was!

But hat's not all. The NYSE is one of the few financial services organizations that does not succumb to resume++. They use technology that gives them three or four nines of availability. As you can imagine, there are not a whole lot of NT systems involved once your order leaves the broker and hits the floor.

## What Presently Obtains

- New business provisioned with existing components used in new ways
- IT Implementations as Business Specifications increase costs but don't prevent this new world because they have become the specification

Tell DOT 30,999 share story

## Why XP Is Working for Netfolio

- Conscious (if conspiratorial) change in information politics
  - We've gone through all five models
- Rigorous business modeling
  - Natural language textual descriptions written with an awareness of deontic logic
  - Use case model
  - UML class and activity diagrams of information in the business domain including OCL
- Has demonstrated scalability across drastic changes in business model

## Information Politics

- Politics happens so let's at least be conscious of it
- Five Models
  - Technocratic Utopianism
  - Anarchy
  - Feudalism
  - Monarchy
  - Federalism

Information Politics is an idea developed by Thomas Davenport, Robert G. Eccles and Lawrence Prusak and described in the Fall 1993 edition of MIT's Sloan Management Review.

(<http://mitsloan.mit.edu/smr/past/archive/smr3414.html>)

## Information Politics Technocratic Utopianism

- Heavily technical in approach to information management
- Stresses categorization and modeling of business's total information assets (enterprise-wide object model)
- Heavy reliance on emerging technology

## Information Politics Anarchy

- No overall information management policy
- Individuals left to manage their own information
- Individuals left to create their own means of information exchange without clear incentives

## Information Politics Feudalism

- Information acquisition, storage, distribution and analysis left to feudal lords and their minions
- Strong disincentives to information sharing outside of fiefdom
- Information "Barons" control flow of information upwards

## Information Politics Monarchy

- Centralized power
- With an enlightened despot this may lead to freer information exchange than feudalism
- If the discussion of "Business Aligned IT" versus "Centralized IT" happens in your organization then you work in a monarchy

## Information Politics Federalism

- Consensus and negotiation form the basis of information management
- Explicit recognition of the importance of politics and treats it as a necessary and legitimate activity
- Leads to information/knowledge market economy

- Requires that all parties recognize the wide array of information resources and are willing to engage in a knowledge economy.

## Why Agent Architecture Works for Netfolio

- Proven software architecture developed by Greg Cowin, Chief Site Architect, was the critical resource available at the start of the project
- Scalable across drastic changes in business model

## Information Politics

- We've traversed all five
- Federalism is the best
- Federalism is the environment in which XP works the best

## Overview

- Business History
- Financial Basics
- Contemporary IT/Business History
- The Netfolio Experience
- Conclusion

## Conclusion

- The comet has hit
- The dinosaurs will either perish or evolve into birds and fly away
- The techniques we've used to support the dinosaurs will not support the rapidly evolving mammals
- Adaptive Agent architectures are not an option they're mandatory
- eXtreme Programming (XP) is not an option it's mandatory

## And If You Have Any Free Time...

- Figure out how I can specify the business concept of contract and the design by contract concept of contract so that I can:
  - Demonstrate the conformance of
    - the emergent properties of an agent based system composed of computers and people
    - to a given business contract
- If you could whip this up by the end of the week, I'd be much obliged