



AGILE ON WALL STREET

AGILES 2008 BUENOS AIRES, ARGENTINA – OCTOBER 23, 2008

Sergio Bogazzi, The Techdoer Times

Agenda

- **Computing Challenges on Wall Street**
- **Agile's Benefits vs. Predictive Methodologies**
- **Challenges Moving Forward**

"In today's economic environment, things change on a dime: the world's coming to an end, and all of a sudden, in 10 minutes, we're in the big rally, having that flexibility is really important." – TABB Group

AGILE ON WALL STREET

People, Process, and Technology

The last decade on Wall Street has seen the accelerated growth in high-performance electronic trading. Some of the key elements driving this growth are:

People

+

Process

+

Technology



Traders



Regulators



Exchanges



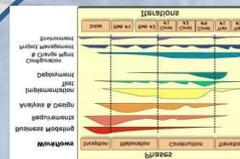
Broker
Dealers

Investment
Bankers

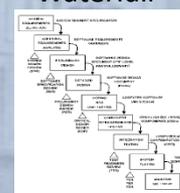
Technologists

...

RUP



Waterfall



XP

...

Scrum



Proximity Hosting



Multi-core



Infiniband



FPGA & GPUs



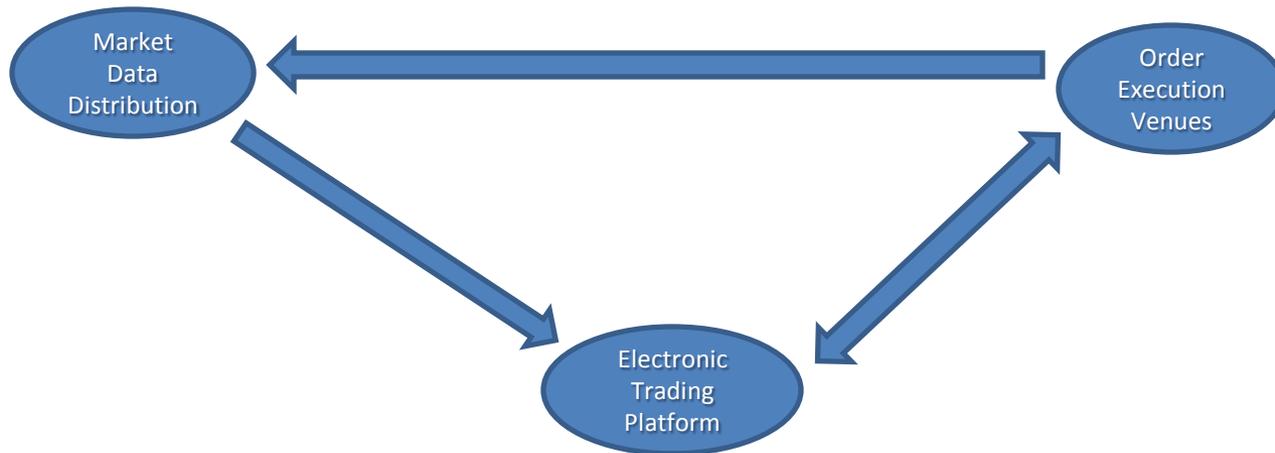
Solid State

...

Electronic Trading

“Options traffic in North America, has increased from 20 MBps to 600 MBps resulting in a 20x increase (from about \$5,000 a month to \$100,000 a month) just in raw network connectivity to handle this data load.” - Savvis

Simplified look at the electronic trading lifecycle:



Development Challenges

Building successful high-performance electronic trading systems on Wall Street requires nimbleness and precision with an explicit focus on:

Non-functional requirements

- Non-ambiguous
- Complex
- Frequently Changing
- Directly tied to profit

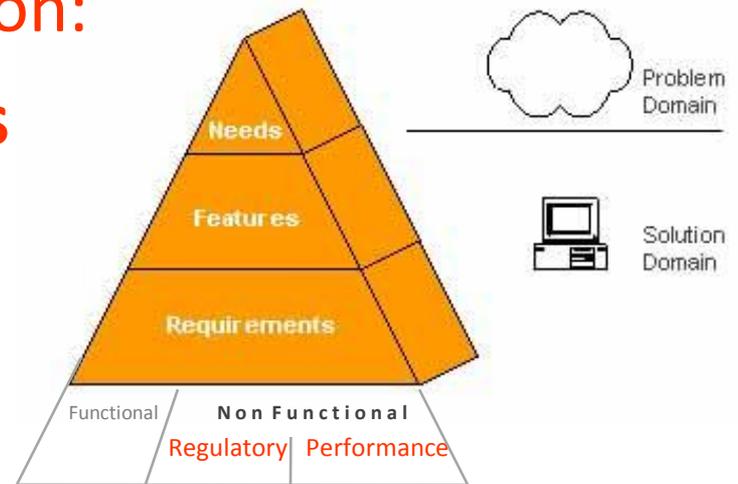


Chart Source: IBM – ibm.com

Why Importance on Non-Functional Requirements

Q: What non-functional requirements do you deal with on a day-to-day basis?

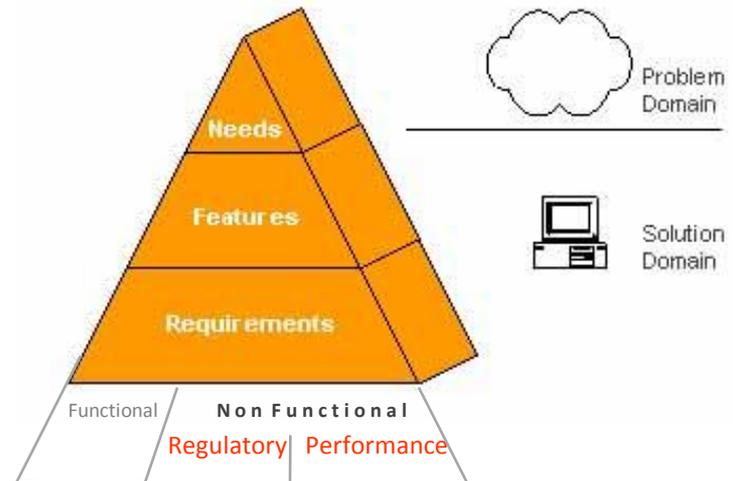


Chart Source: IBM – ibm.com

Development Challenges

"Five years ago we were talking seconds, now we're into the milliseconds, five years from now we'll probably be measuring latency in microseconds." BATS CEO Cummings

Q: What challenges do software teams face on Wall Street?

- Electronic trading's focus on **non-functional requirements**
- **Constant changes** to regulation and trading strategies
- **High-pressure, high-stakes, highly-competitive, relationship-oriented** industry

Lets take a look at non-functional requirements on Wall Street...

Non-Functional Requirements

Low Latency - At 140,000 messages/sec, zero-message loss and mean-latency must not exceed 1.5 milliseconds.

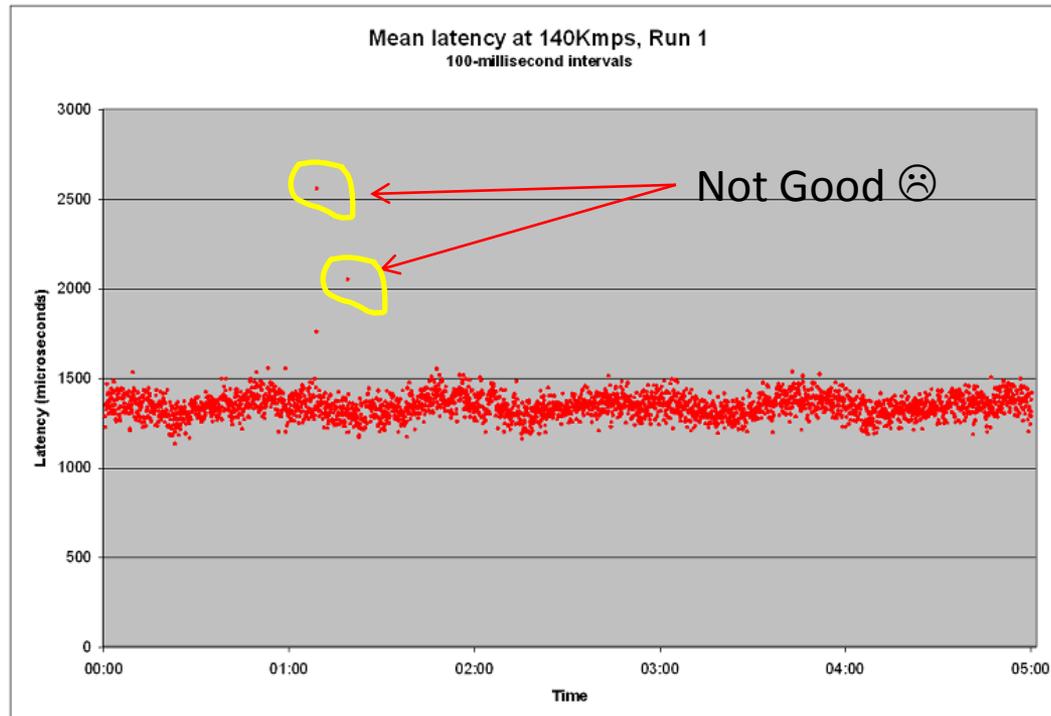


Chart Source: STAC Research - <http://www.stacresearch.com>

“If a broker’s electronic trading platform is 5 milliseconds behind the competition, it could lose at least 1% of its customer order flow; that’s \$4 million in revenues per millisecond. Up to 10 milliseconds of latency could result in a 10% drop in revenues.” - TABB

Non-Functional Requirements

CPU Utilization Threshold – For escalating message rates, zero-message loss, average latency under 1.5 milliseconds and aggregate CPU utilization must stay below 30% utilization.

Not Good 😞

“..peak conditions can average 50x or more above their average” – 29 West Messaging

Performance Latency Evaluation			Latency μ								
	Data Rate	msg/sec	Min	Average	Max	50th	90th	95th	99th	CPU 1	CPU 2
Vendor 1 Platform	Market Open	49,700	780	1056	10000	930	4100	4320	9280	80%	34%
	Midday	5000	550	980	4500	630	3000	3450	4100	75%	15%
Vendor 2 Platform	Market Open	51,000	792	1100	13000	880	6900	7800	12300	71%	23%
	Midday	4890	600	1000	5000	670	2900	3600	4900	65%	20%

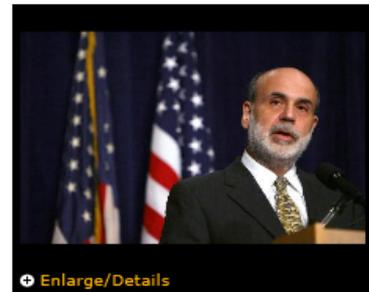
*** Sample Size = 1000
 *** Measures in microseconds

Non-Functional Requirements

High Throughput - Zero-message loss up to 1,200,000 messages/second.

Bernanke Signals Fed May Cut Rates as Crisis Deepens (Update3)

By Scott Lanman



Oct. 7 (Bloomberg) -- Federal Reserve Chairman **Ben S. Bernanke** signaled policy makers are ready to lower interest rates as the credit freeze poses an escalating danger to the economy.

The world financial system is under "extraordinary stress" and history shows that severe instability "can take a heavy toll on the broader economy if left unchecked," Bernanke said in a speech in Washington. "The Federal Reserve will need to consider whether the current **stance of policy** remains appropriate."

Article Source: Bloomberg.com

Statements from Federal Reserve Chief around 2pm ET on October 7, 2008

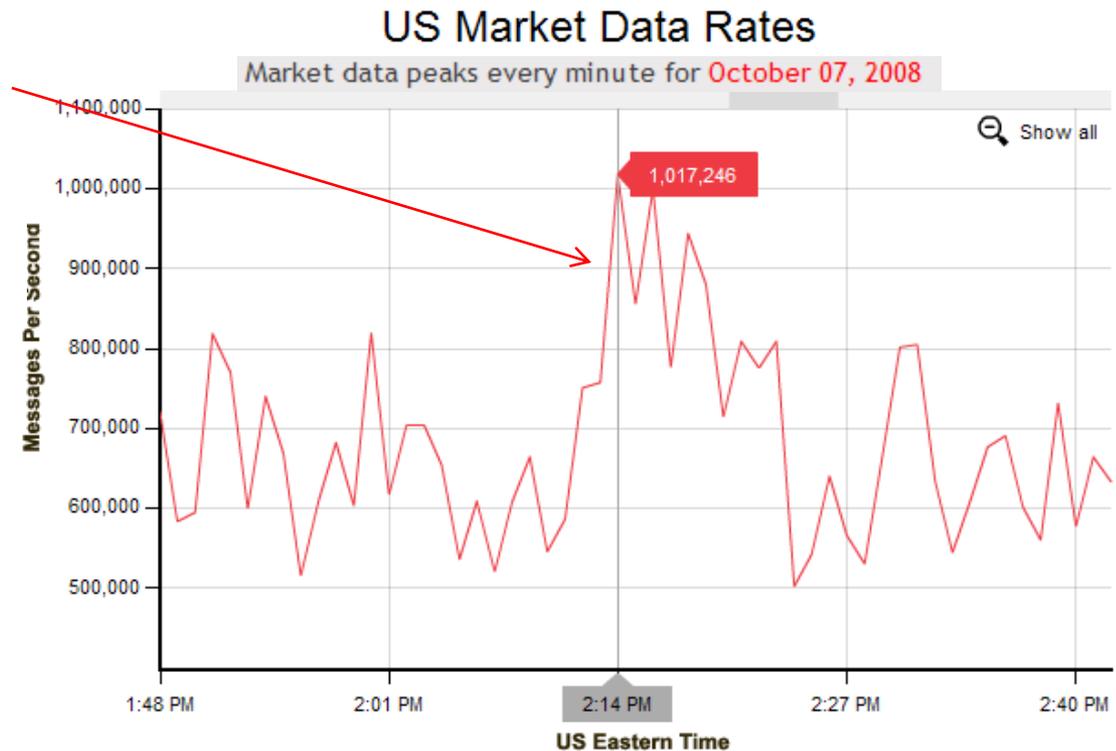


Chart Source: Market Data Peaks – marketdatapeaks.com

and more non-functional requirements...

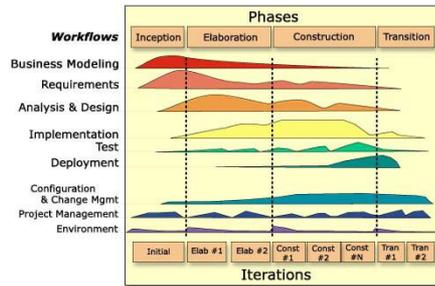
Some regulatory requirements from the Securities and Exchange Commission:

“If a market repeatedly does not respond within **one second or less**, market participants may exercise ‘self-help’ and avoid that market for purposes of the Order Protection Rule”

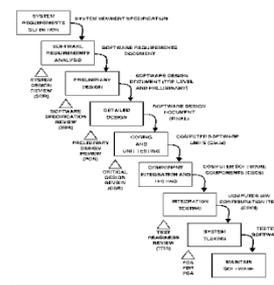
“...transactions that are subject to NASD Rules 6130(g) and 6130 (c) and also required pursuant to an NASD trade reporting rule to be reported within **90 seconds.**”

Let’s look at the development approaches behind these requirements...

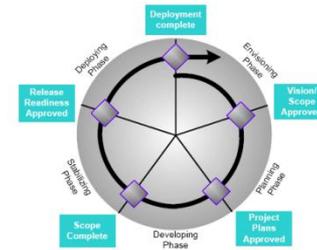
The Problem with Predictive Approaches



Unified Process



Waterfall

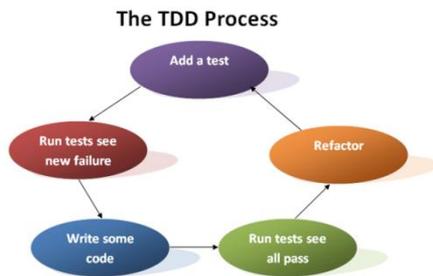


Microsoft Solutions Framework

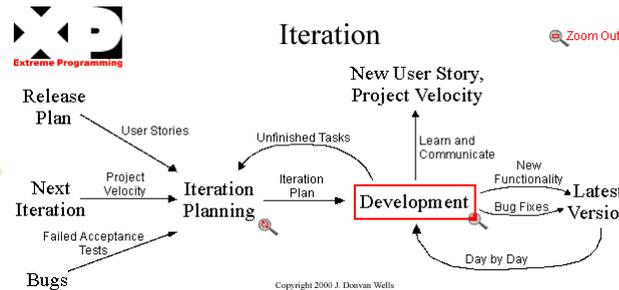
Predictive approaches rely on detailed upfront **design** and **planning** prior to implementation, followed by thoroughly **documented** working systems.

- Industry change is frequent and lightening fast
- Time is money
- Trial-and-error more effective with proprietary approaches
- Adapting to customer's day-to-day activities is critical

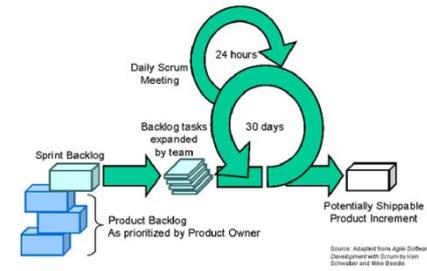
Benefits Behind Adaptive Approaches



Test-Driven Development



Extreme Programming



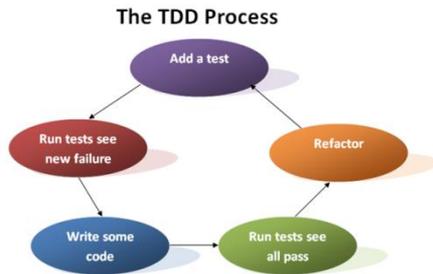
Scrum

Adaptive approaches (e.g. Agile) put the customer needs, not the software requirements specification, as the ultimate measure of quality.

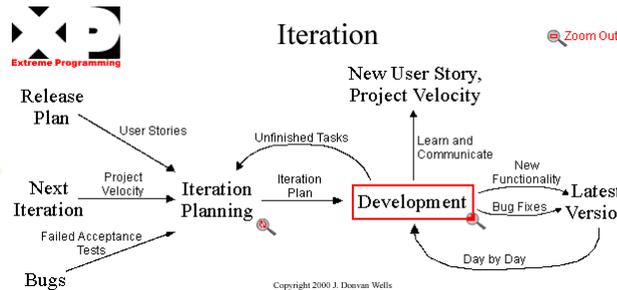
These approaches deliver **cultural**, **managerial** and **engineering** benefits, empowering small teams to tackle Wall Street's toughest business problems including the performance an regulatory non-functional requirements presented here.

Let's take a closer look at these benefits...

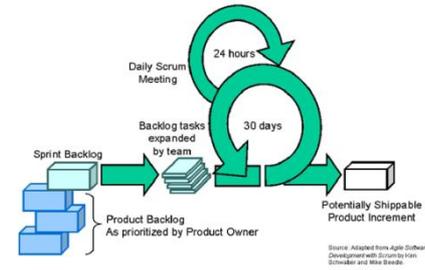
Cultural Benefits of Agile



Test-Driven Development



Extreme Programming



Scrum

Self-Organizing Teams – Attracts key individuals and puts their intrinsic motivation as the driver behind innovative, non-commoditized designs and solutions.

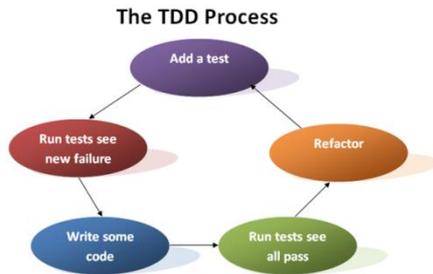
Move People Around – Helps foster individual motivation required for complex problem solving and introduces cross-training that cycles both tacit and explicit knowledge between business and technology.

Embracing the Customer – Is key in an industry where business and technology are so intertwined.

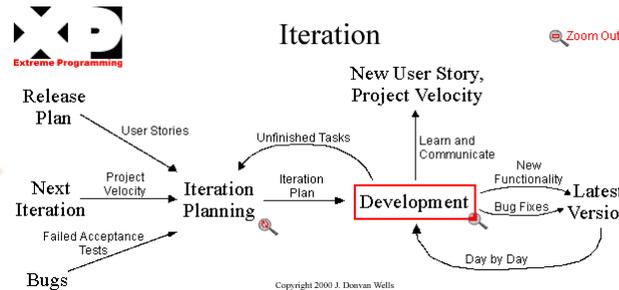
No Overtime – In this high-stakes, high-stress industry helps avert burnout and is key toward sustainable progress.

Iterative Development – Inspires hard-to-get-a-hold-of customers to contribute early on in the development process. Iterative lifecycle with daily meetings more closely aligned with day to day business activities - Market opens at 9:30am ET and closes at 4.

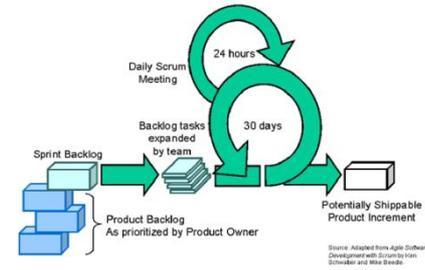
Managerial Benefits of Agile



Test-Driven Development



Extreme Programming



Scrum

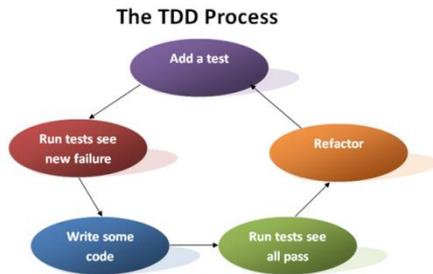
Frequent Deliverables – Mitigates the risk that complex temporal requirements won't be met. Demonstrating to customers that non-functional requirements have been implemented is harder than demonstrating successful implementation of functional requirements.

Project Velocity - and other empirical productivity metrics are key to building schedules the business and development teams can trust.

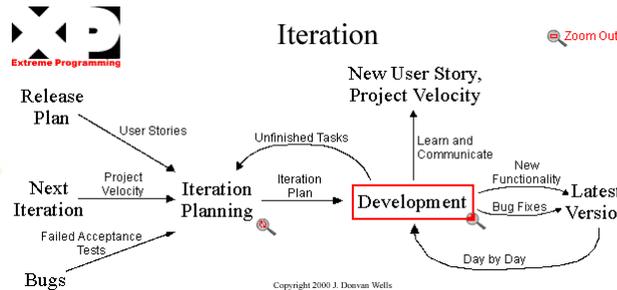
Product Backlog - Helps ensure highest priority needs are implemented first.

Daily Meetings – Introduces continuous accountability among team members. Helps identify and address risks in non-commoditized components early and often.

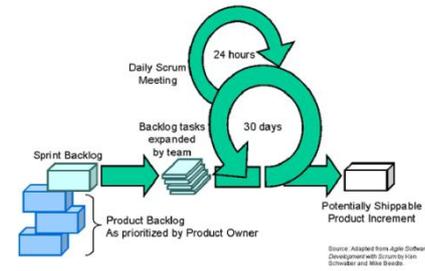
Engineering Benefits of Agile



Test-Driven Development



Extreme Programming



Scrum

Test-Driven Development – Helps put a visual interface and adds much needed transparency to the implementation of non-functional requirements.

Continuous Integration – With performance latency measures in microseconds, for example, even the smallest code change can break non-functional requirements. CI mitigates the risk of this happening by alerting team members early and often.

Collapsing Design Time – Differentiation lies in the sophistication of the internals and their ability to outperform competition with respect to non-functional requirements which change often. Upfront design runs the risk of being outdated.

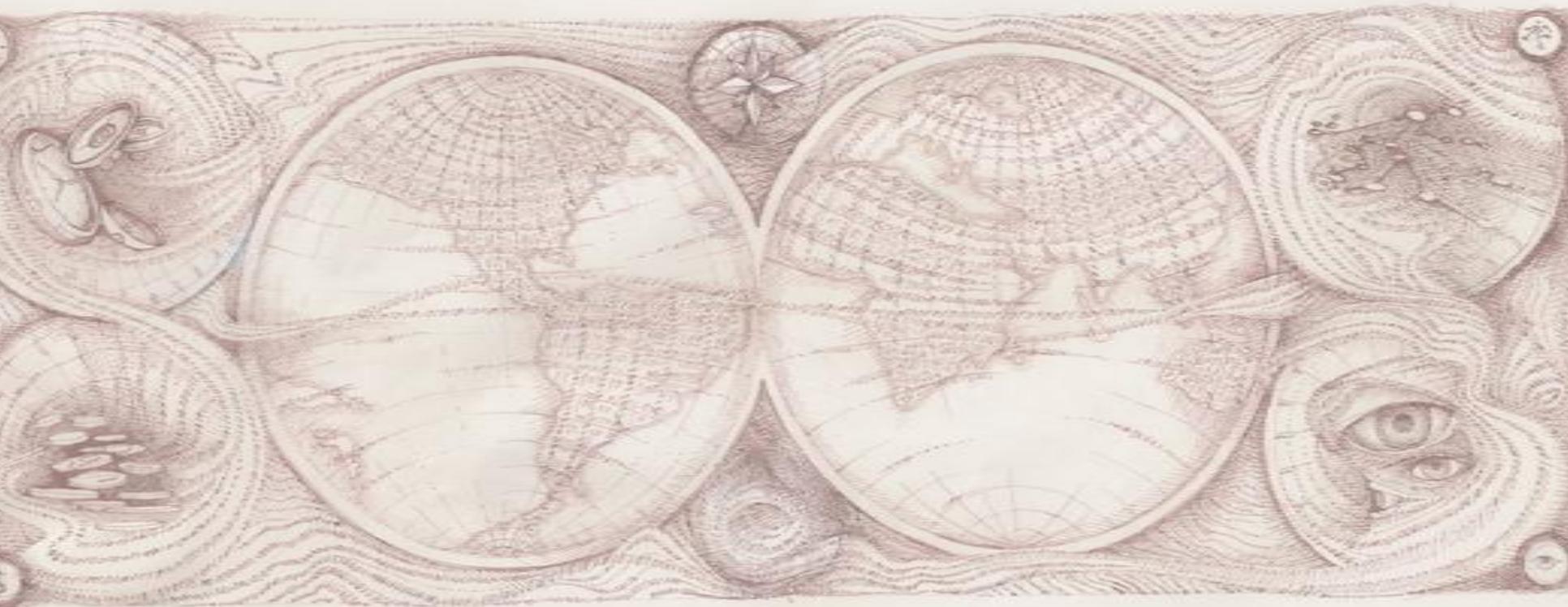
Refactoring – Empowers teams to deliver working software early while continuously evolving the codebase towards desired state.

Agile's Future Challenges

- Parallel Computing
- Test runs that measure in minutes and hours versus seconds
- Integrating managed service providers
- Evolving TDD for Non-Functional Requirements
- Evolving TDD for Distributed/Managed Systems
- Agile for Distributed Teams
- New regulations set to take over Wall Street

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Thank You



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