RENDITION 2

PRECISION:

THE SCIENCE OF COMPLIANCE

Nth Degree FINANCIAL SOLUTIONS

August 8, 2017

Objectives

Three things:

1. Understand why applying "**Find It – Focus - Fix It**" model to business processes through testing will enable organizations to determine whether they are operating "in compliance" (Precision)
2. Understand what measurements (metrics) can be developed with "**Find It – Focus - Fix It**" model
3. Understand benefits when Business Units embrace "**Find It – Focus - Fix It**" model

Why "Science" and Why "Testing"

- Science provides the the structure to achieve ***precision***
  - Increases Quality
  - Decreases Risk
- Testing is a basic element of ***science***
  - Determine cause and effect
  - Builds knowledge and intuition
- In the financial services industry today the need for order and understanding has never been more prominent
  - Need for ***precision*** has increased
    - Small variances from standards can cause significant problems
  - Need for ***intuition*** has increased
    - Must know what works and what doesn't

Why "Science" and Why "Testing"

- Science addresses all of these needs

"*All Science is motivated by the desire to bring order to the world around us*."

Hopp, Wallace J. and Spearman, Mark L, *Factory Physics*, Waveland Press, Inc., 2008

"*I am a research scientist, and a conservative one at that. The appeal of what I write comes from the fact that it is grounded in careful science: statistical tests, validated questionnaires, thoroughly researched exercises, and large, representative samples. . . . my writings are believable because of the underlying science*."

Seligman, Martin E.P., *Flourish*, Atria Paperback, a Division of Simon & Schuster, Inc., 2013

- This Science of Compliance "**Find It – Focus - Fix It**" model will enable financial institutions to better design and manage rule-based business and control systems

Precision of Terminology and Usage

- A first step towards Precision is to distinguish compliance as a **function** from compliance as a **process**
  - As a **Function**: sets the Compliance Standard, which is the conformity of internal policy, procedure and process with laws, rules and regulations and best practices applicable to its business
  - As a **Process**: ensures that the company and its employees are following established rules and standards
- This also applies to other control functions, like audit and risk management.

Regulatory Requirement for "Testing"

The regulatory expectation for testing is not new and is not limited to large financial institutions

- In 2005, FFIEC guidance first mandated "independent testing" of BSA/AML/OFAC and continues to require such testing:
  - As part of the scoping and planning process, examiners should obtain and evaluate the supporting documents of the independent testing (audit) of the bank's BSA/AML compliance program. The federal banking agencies' reference to "audit" does not confer an expectation that the required independent testing must be performed by a specifically designated auditor, whether internal or external. However, the person performing the independent testing must not be involved in any part of the bank's BSA/AML compliance program (for example, developing policies and procedures or conducting training). Audit findings should be reported directly to the board of directors or a designated board committee composed primarily of or completely of outside directors.

Note: in this instance, "compliance program" should be understood to include the development of policy, procedure, training, and the process of complying with the requirements of the BSA/AML/OFAC regulatory requirements

Guidance: From Descriptive to Prescriptive

- Financial Services rules have been moving from Descriptive to Prescriptive

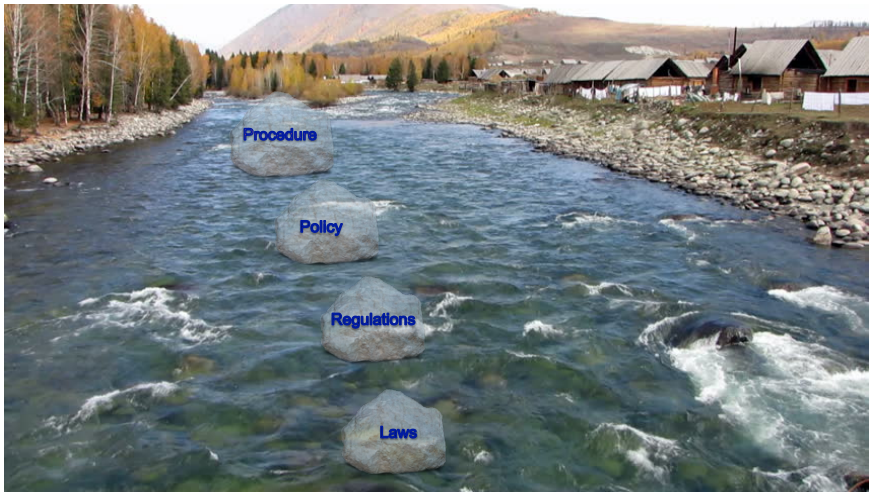
Descriptive (what for)		Prescriptive (how to)
Laws	→	Regulations
Policy		Procedures
Strategic Objectives		Operational Objectives

- Recent example – FFIEC developed Cybersecurity Assessment Tool in 2015
  - To "help institutions identify their risks and determine their cybersecurity preparedness"
  - It "provides a repeatable and measurable process"
- This is a **precise** risk framework for a **standardized** approach
  - Examiners will be able to compare cybersecurity preparedness across the industry
- This **precise standardized** approach is a movement toward **quality**
  - Designed to enhance Safety and Soundness across the country
- This movement toward **quality** is achieved in the financial services industry through the use of **descriptive** rules and the **prescriptive** placement and use of these rules designed to regulate ***flow***

Nth Degree FINANCIAL SOLUTIONS

7

Quality Movement: Flow Versus Rocks

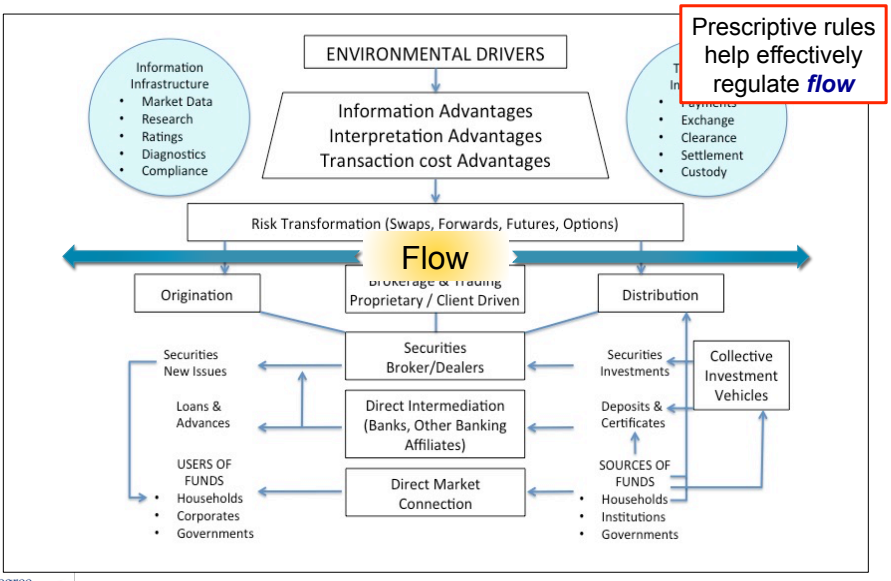


- Rules regulate **flow**

Nth Degree FINANCIAL SOLUTIONS

8

Quality Movement: Financial Services → flow



Nth Degree FINANCIAL SOLUTIONS

9

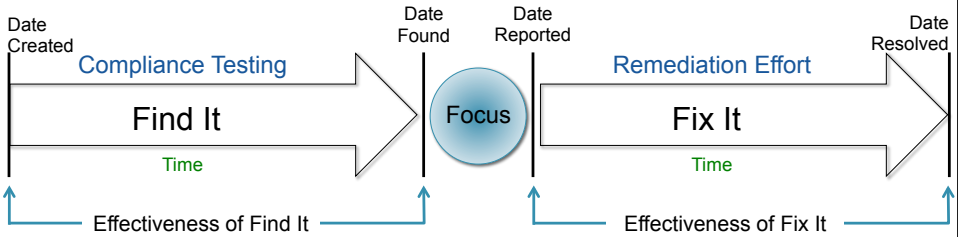
Quality Movement: When water level is lowered…

Nth Degree FINANCIAL SOLUTIONS

10

Precision through Testing

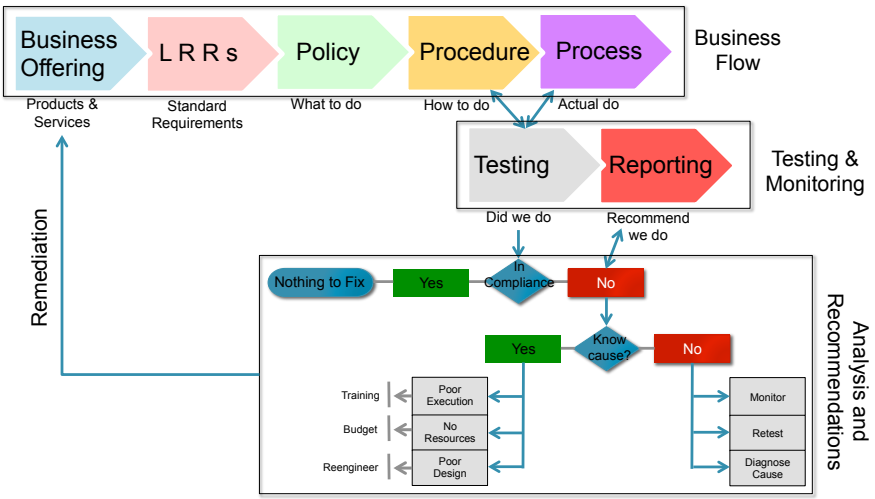
- In financial services, unlike manufacturing, defects must be detected
  - They cannot easily be seen
- Detection is done through testing (Scientific Method)
  - E.g., BSA/AML testing, compliance testing, audit programs
    - Such tests are required to be independent, **precise**, and comprehensive
  - We have to Find It, Focus, and Fix It. Fast! And FASTER**!!!**



Nth Degree FINANCIAL SOLUTIONS

11

Model: Find It - Focus - Fix It

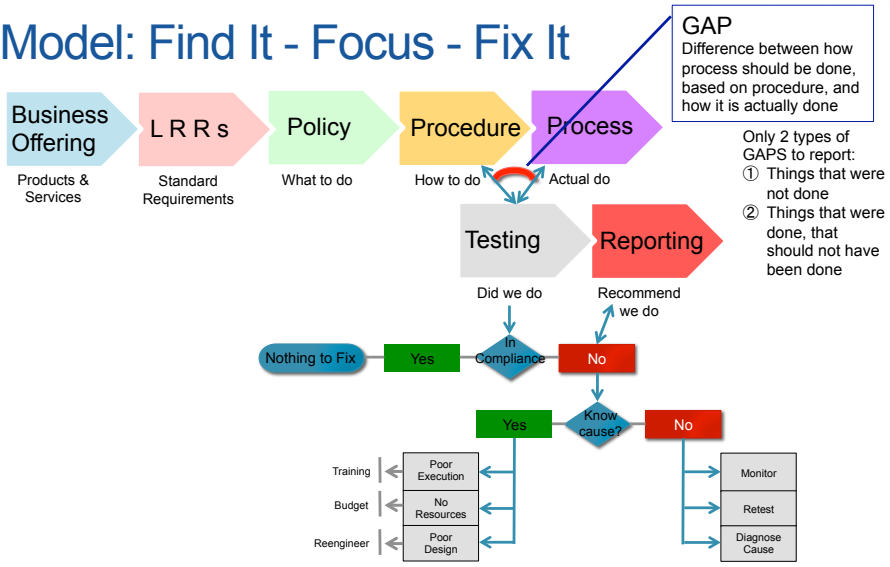


Testing of business processes to assess "compliance"

Nth Degree FINANCIAL SOLUTIONS

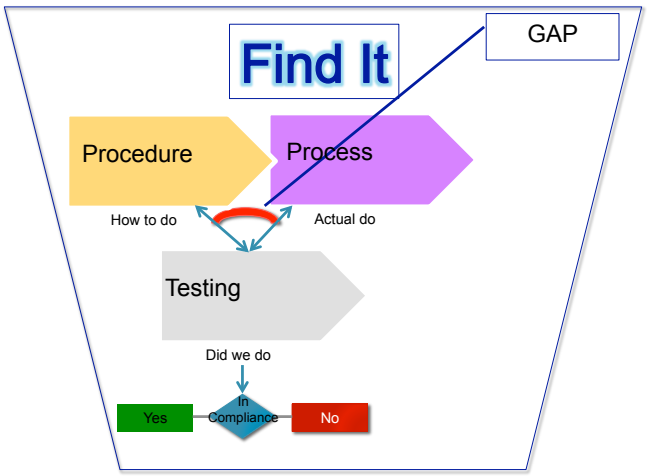
12

Model: Find It - Focus - Fix It



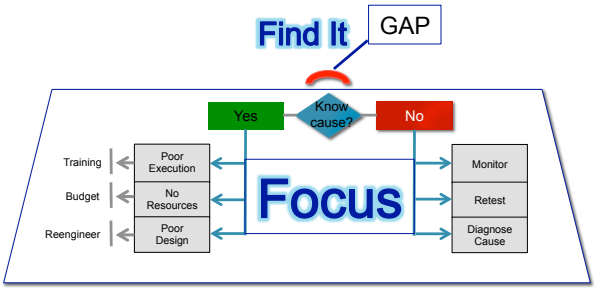
Testing of business processes to assess "compliance"

Model: Find It



This is the "**Find It**" element of the model

Model: Focus



This is the "**Focus**" element of the model

Let's create a focusing metric next.

Focus: Risk-Based Prioritization for Compliance

- How do we prioritize test results?
  - How do we **focus**?
  - How do we measure effectiveness of compliance process?

Start with current Operational Risk Measurement Formula:

Operational Risk = ($p_e \times s_e \times f_e$)

Where:

p_e is **p**robability of [risk] **e**vent

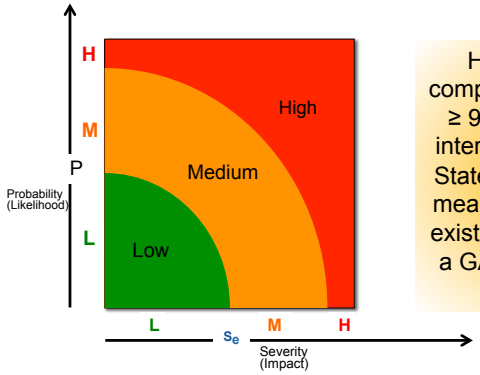
s_e is **s**everity of [risk] **e**vent

f_e is **f**requency of [risk] **e**vent

Focus: Risk-Based Prioritization for Compliance

Operational Risk = (p_e × s_e × f_e)

- Historically, low precision qualitative measures where heat maps used to prioritize



However, post compliance testing @ ≥ 95% confidence interval, then p_e = 1. Stated in words, that means the risk event exists. Thus, there is a GAP that must be diagnosed

Focus: Converting to Compliance Risk

Compliance Risk = (1.0 × s_e × f_e) × *time*

Once compliance testing is performed at ≥ 95% confidence interval then p_e = 1.0, s_e = H, M, or L, and the f_e is the number of exceptions identified at each Severity level.

The example below illustrates compliance testing results for Operational Risk where 10 exceptions were identified as High Risk items, 15 exceptions were identified as Medium Risk items, and 50 exceptions were identified as Low Risk items.

Severity	p_e × s_e × f_e		Ops Risk
HIGH	1.0 X **H** X 10	=	10**H**
MEDIUM	1.0 X **M** X 15	=	15**M**
LOW	1.0 X **L** X 50	=	50**L**

× *time*

Focus: Converting to Compliance Risk

To convert operational risk to *compliance risk*, multiply operational risk results by average # of days that the compliance exceptions have been outstanding.

Q: Where does this # come from?

A: **Find It - Focus - Fix It**

Ops Risk		Avg Days*		Compliance Risk Days**
10H	×	10	=	100H
15M	×	100	=	1,500M
50L	×	100	=	5,000L

High Compliance Risk Days

Medium Compliance Risk Days

Low Compliance Risk Days

* Average number of days for illustration purposes only

**A *compliance risk* day is the average number of days that a High, Medium, or Low level *compliance risk* exception has existed within the testing area until it is fixed

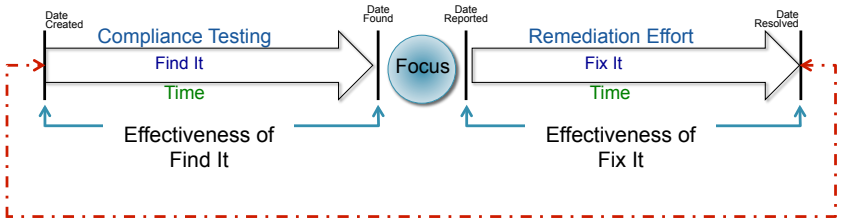
Overall Objective:

- Reduce "Find it" and "Fix it" times
- Learn lessons of why High *compliance risk* exceptions exist to reduce their frequency of occurrence

Nth Degree FINANCIAL SOLUTIONS

19

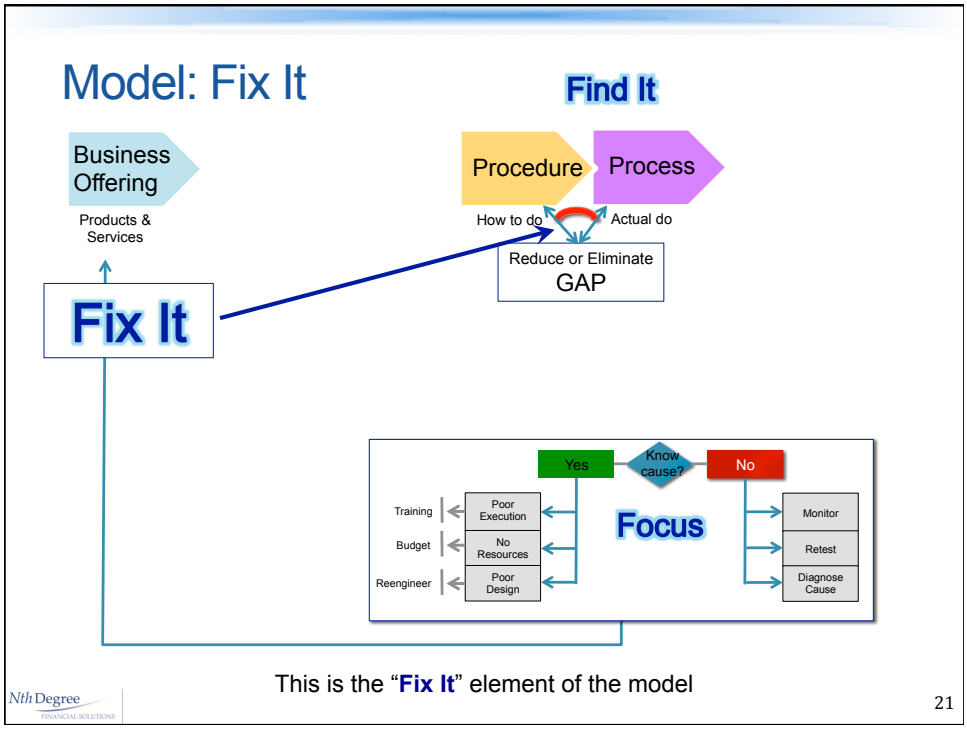
Model: Find It - Focus - Fix It



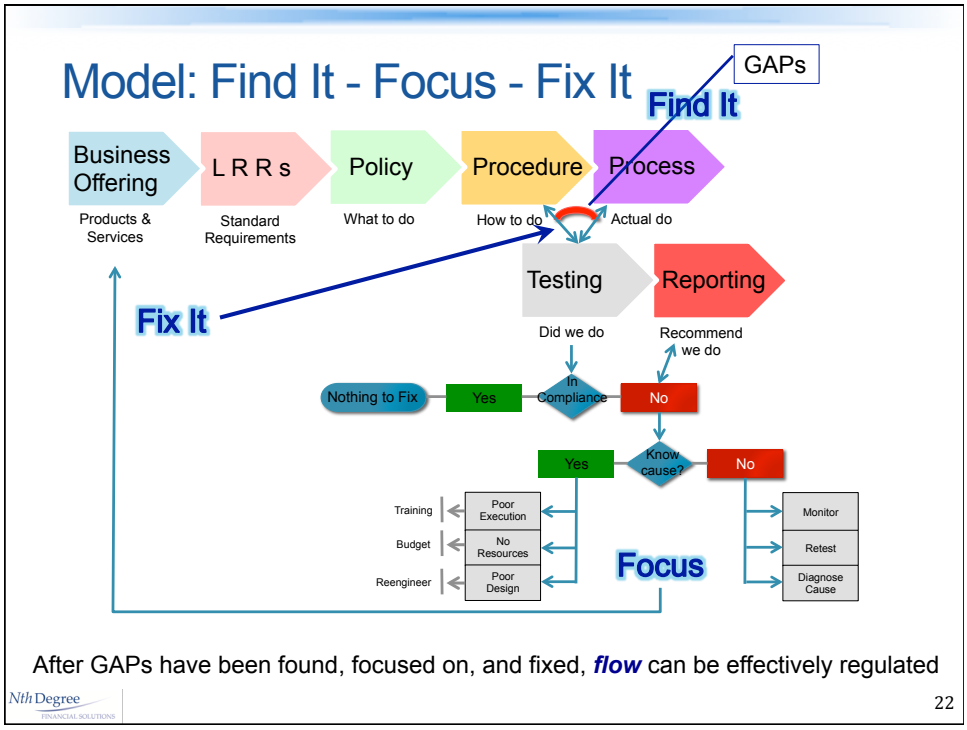
- Over time, this model is designed to be iterative, with a feed-back loop to take into account changes to business offerings, Laws, Rules, and Regulations, and Policy.

Nth Degree FINANCIAL SOLUTIONS

20



This is the "**Fix It**" element of the model



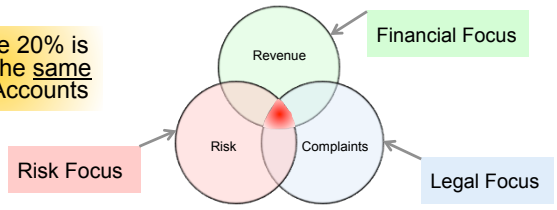
After GAPs have been found, focused on, and fixed, ***flow*** can be effectively regulated

Why is there Resistance?

- Is there a different focus?

Pareto's Law
Aka The
80/20 Rule

. . . but the 20% is **not** from the same group of Accounts



Control units focus on Rocks and Risk

Nth Degree FINANCIAL SOLUTIONS

23

Businesses Focus on Flow: Little's Law

- Flow is measured and controlled by the relationship between three process variables:
  1) Work in Process (WIP)
  2) Throughput (TH)
  3) Cycle Time (CT)
- **Little's Law**, named after John Little, states that work in process is calculated by multiplying the throughput of that work by the amount of time that work takes to move through one cycle. The formula[1] is expressed as follows:

$$WIP = TH \times CT$$

- Where:
  - Work in Process (WIP) is the average amount of work in a process that is between start and end points is defined as *work in process*. (Qualified leads in a sales process, audit engagements in fieldwork, loans transitioning to a securitized debt instrument, etc.)
  - Throughput (TH) is the average output of a serial process (i.e., sales, new account on-boarding, underwriting, account review, audit engagements, etc.) per unit time (i.e., new revenue per month) is defined as the system's *throughput*. Note: this definition requires zero defects. If the process produces defective output then it is not throughput; the output remains WIP because the defect requires more work to fix it.
  - Cycle Time (CT) is the average amount of time that transactions spend as work in process.

[1] This expression of Little's Law is taken from the book, Factory Physics, and is described therein as a "key Factory Physics" principle

Nth Degree FINANCIAL SOLUTIONS

24

Example: Financial relationships & Little's Law

The concept of ***leverage*** via application of Little's Law:

- Throughput (TH) is the rate at which a business operation generates cash (revenue) through sales. For example, Revenue per Year.
- Investment (I) is the amount of money and talent invested in a business represented in Financial Services by financial and intellectual capital allocated to a given business unit.
- Operating Expense (OE) is the amount of money that a business uses to convert Investment (I) into Throughput (TH).
- Therefore:

Net Profit: NP = (TH - OE)

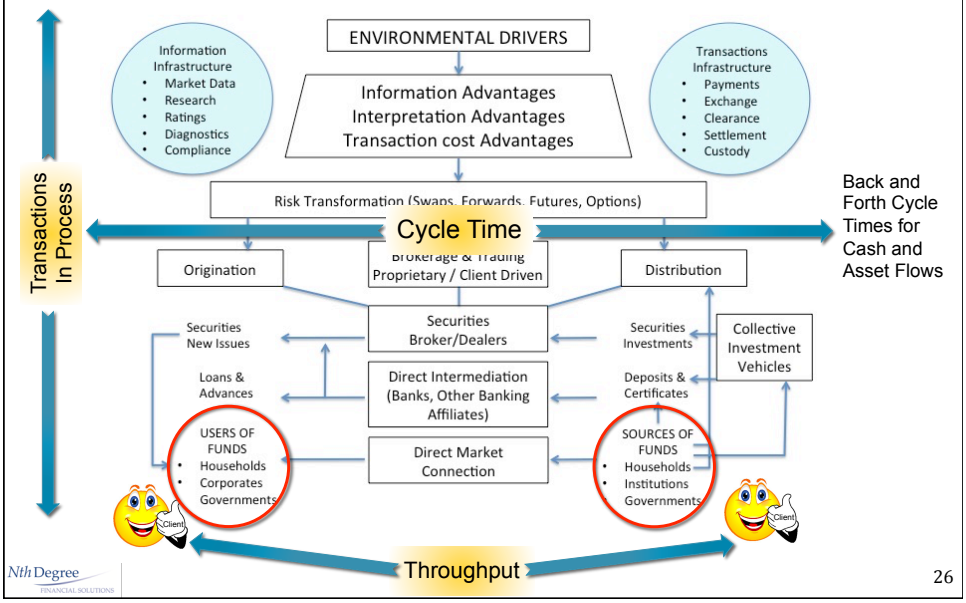
Investment Return: ROI = (NP/I)

…and so on

Nth Degree FINANCIAL SOLUTIONS

25

Applying Little's Law in Financial Services

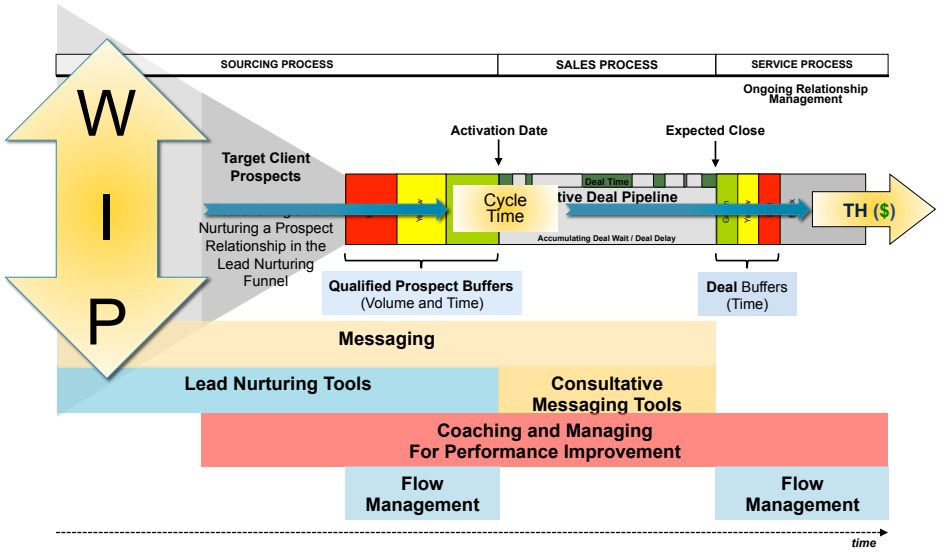


Nth Degree FINANCIAL SOLUTIONS

26

Little's Law in the Funnel & Client Service

Applied to Sourcing, Sales, and Service Funnel

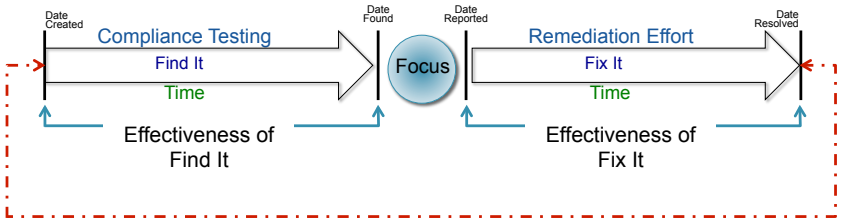


*Slide design by T Mark Keith

27

Little's Law in the Model

"Find GAPs" "Focus on Leverage" "Fix Flow"



- Over time, this model is designed to be iterative, with a feed-back loop to take into account changes to business offerings, Laws, Rules, and Regulations, and Policy.

28

Example – Little's Law Applied

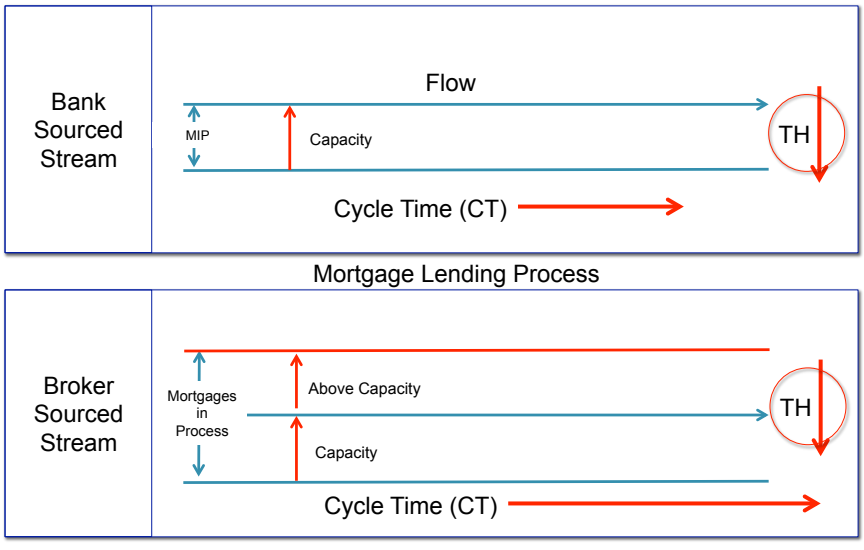
- **Costly Lessons from Unsupervised Outsourcing**
- Institutions often use third parties, such as mortgage brokers, to generate mortgage loans
- An examination of an institution well versed in mortgage lending revealed substantial problems related to its mortgage broker network. Product offerings by both the institution and its third-party mortgage brokers had rapidly evolved and expanded. To meet growing demand, the institution shifted its product and delivery channel strategies. In only a brief period of time, the institution's broker network expanded significantly.
- At the same time, the institution's due diligence process for brokers was relaxed. The institution's financial standards for the third-party mortgage brokers it used quickly became more liberal than the institution's lending standards. Simple background checks, costing only a few dollars, were foregone for the sake of expediency. Monitoring processes were lax. The lending-volume threshold to trigger closer reviews of loan quality was set so high that practically no brokers were ever subject to the reviews. Underwriting standards were also relaxed. While the institution used a watch list, essentially brokers were placed on the list only if suspicious activity (i.e., fraud) was actually reported. Even when a watch designation was assigned, the institution's systems allowed for continued funding without further review.
- Unfortunately, but not surprisingly, the institution recognized these inadequacies only after credit losses increased substantially.
- ***No Substitute for Due Diligence and Oversight.***
- Problems arise not from the absolute volume of relationships, but from the quality of the risk management processes employed. In this example, controls over the network were perfunctory at best. The institution appeared to have a process but, in practice, the process controlled very little.

- Can we do better now?

Nth Degree FINANCIAL SOLUTIONS

29

Example – Little's Law Applied



Nth Degree FINANCIAL SOLUTIONS

30

Example: Find It - Focus - Fix It

- To absorb increase in Mortgages in Process (MIP), "rocks" were reduced or removed to bring Cycle Time (CT) down to broker acceptable turnaround times

Rocks:	CT ↓ if:
Due diligence process for brokers	Reduced
Broker Sourced Lending Standards	Reduced
Borrower background checks	Removed
Monitoring Process	Reduced
Loan Review Risk Thresholds	Removed
Underwriting Standards	Reduced
Broker watch designation and control	Reduced

All identified with effective process testing

Conclusion: The Complete Iterative Program

How to install:

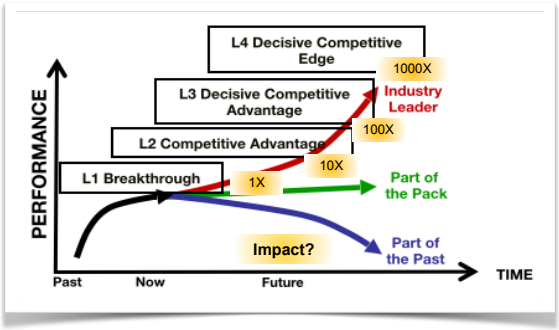
1) Testing is required and it is necessary
   - Develop appropriate tests.
   - Execute effectively
2) Identify GAPs and prioritize
   - Risk probability equals 1.0
   - Risk rank GAPS
   - Calculate compliance risk by adding time component
   - Manage "***Find It - Focus - Fix It"***
3) Know that flow matters
   - Constantly monitor impact on Cycle Times (CT)
   - Ensure that Throughput (TH) can be maintained within control tolerance
4) To improve flow, find and manage the rocks.
   - Use testing methods to detect "Rocks"
   - Apply Little's Law to safely and soundly improve flow.
5) Repeat

- A transparent, measurable, and controllable process of ongoing improvement has been installed

ENJOY YOUR SUCCESSFUL CAREER

Conclusion: Three Keys to Success

- The three keys to success of this project are:
  1. Measures alignment. (Flow Rate vs. Risk Level)
  2. Integration of measures into existing management and control systems
  3. Training staff, first level managers, middle managers, and executives



Nth Degree FINANCIAL SOLUTIONS

33

Conclusion:

1. Ready to apply "**Find It – Focus - Fix It**" model to business processes through testing to determine whether your organization is operating "in compliance" (Precision)

2. Develop appropriate metrics with "**Find It – Focus - Fix It**" model and the results of testing

3. Use concept of Little's Law to help Business Units embrace "**Find It – Focus - Fix It**" model

Nth Degree FINANCIAL SOLUTIONS

34

Next Steps:

1. My colleague and friend, Rob Respler, has created an invitation only linkedin group called, “Risk Masters”
   - I will be sending you an invitation to join this group over the two weeks
2. Nth Degree Financial Solutions will work with you through on-line consulting to develop specific applications for your organization
3. The next presentation will be an on-line learning event
   - Tuesday, September 19, 2017 at 4pmEDT

Contact Information

- Matt Eby – Host
  matt.eby@nthdegreefinancial.com
- Joanne Eby – Compliance Expert
  joanne.eby@nthdegreefinancial.com
- Charlie Einstein – Production Coordinator
  charlie.einstein@nthdegreefinancial.com
- Eli Schragenheim – Advisor and International Implementer
  elischragenheim@gmail.com
- T Mark Keith – Advisor and Artificial Intelligence Expert
  mark@aiinnovation.com
- Dr. Alan Barnard – CEO Goldratt Research Labs
  www.goldrattresearchlabs.com
- Sherrie Krowczyk-Mendoza – Collaborator
  sherrie.krowczyk-mendoza@bakertilly.com

Follow Up: Putting It All Together

- This webinar sets the foundation for our scientific approach to developing the basics, intuition, and synthesis skills needed by the modern Financial Services organization
- The main observations about the need for and use of this approach are as follows:

1) *Financial Services management needs a science*. Although considerable folk wisdom exists about running the firm, there is still only a small body of empirically verified, generalizable knowledge for supporting the design, control, and management of the financial system. If we are to move beyond fads and slogans, researchers and practitioners need to join forces to evolve the science that has emerged.

Nth Degree FINANCIAL SOLUTIONS

37

Follow Up: Putting It All Together

2) *A scientific approach is a valuable management tool*. By using a holistic view of the enterprise and promoting a clear link between policies and objectives, improvements in performance and control are both significant and predictable.
3) *Good descriptive models lead to good prescriptive models*. Trying to stabilize a system not understood is ***futile***. We need descriptive models to sharpen intuition and focus attention. Furthermore, policies based on accurate descriptions of system behavior are more likely to work with, rather than against, the system's natural tendencies. Such policies are apt to be more robust than those that try to force the system to behave unnaturally.
4) *Models are a necessary, but not complete, part of a manager's skill set*. Because systems analysis demands that alternatives be evaluated with respect to objectives, some form of model is needed to make trade-offs for decision problems. Models can range from simple to complex. The *art* of modeling is in the selection of the proper model for a given situation and the coordination of the many models used to assist the decision-making process.

Nth Degree FINANCIAL SOLUTIONS

38

Follow Up: Putting It All Together

5) *Financial accounting typically provides poor models for process and procedure decisions*. The purpose of accounting is to tell where the money is/went, not where to spend new money. Operations decisions require good characterization of *marginal expense* and appropriate consideration of resource constraints.
6) *A coherent and unified methodology for improvement must be employed*. A good scientific framework is only the beginning. To be successful there must be a clear methodology that takes into consideration management issues such as "measures alignment" as well as integration into existing management systems. Furthermore, the methodology must provide for training at the appropriate level of detail for all levels of management and in the workforce.

Science of Compliance: Implementation

Warning
- Something to avoid, a problem or mistake

Signal
- An indicator which provides direction

Insight
- A lesson learned from experience

*Provided by world-renowned implementation expert, Eli Schragenheim

Science of Compliance: Implementation

Warning

- One of the most disastrous situations for any organization is when **the capacity of people is exhausted**.
  - Humans under pressure and scrutiny feel threatened
  - Additional mistakes are made due to the pressure and scrutiny
  - Then mistakes are hidden, disguised, or others are blamed
- Even when the testing is done by an independent and objective group, the testing itself, and its outcomes, generate more load on the capacity of the workers.

Science of Compliance: Implementation

Warning

- Flaws in test ***design*** could destroy the credibility of ALL tests!

Science of Compliance: Implementation

Warning

- Correcting a defect is a CHANGE and it adds load on the workers
  - This could easily lead to misunderstanding, blame, and embarrassment

Science of Compliance: Implementation

Signal

- Testing reveals several defects in the existing process – what happens then?
  - Is it always obvious how to correct the defect?
  - Maybe the defect was created because of a reason? If we do not understand the reason we might make a major mistake by just trying to fix the defect.
  - Who is in charge of correcting the defects?
- Answers to these questions should be part of the overall Testing Process

Science of Compliance: Implementation

Signal

- A material defect, or damaging exception, points to a GAP between regulators and/or executive management expectations and the existence of the defect or exception
  - This GAP should invoke a learning session regarding why such a GAP exists
  - A learning session should be performed by a team, including a seasoned facilitator, at least one person who was directly involved with the environment that created the defect/exception, and one person relatively independent from the specific process

Science of Compliance: Implementation

Signal

- Cultural Change
- Learning from GAPs that were found and fixed requires implementing a structured learning process
  - Including being able to differentiate between the trivial and the critical
- And requires implementing the cultural change, where mistakes are **clearly forgiven**, as long as the lessons have been learned.

Science of Compliance: Implementation

Insight

- There is a basic requirement to **streamline testing**, along with the correction efforts, **to an acceptable pace**, making sure the burden on workers is not too high
  - This requires **prioritization** and building a Pareto Chart of the procedures being tested
  - It also requires determining how many different procedures can be tested at the same time without disrupting the regular performance of the organization

Science of Compliance: Implementation

Insight

- There is a need to prioritize the defects and implement the changes according to the established and agreed upon priority
  - To ensure the pace of implementation is monitored so that overall pressure is kept under quantifiable control
- This regulated pace is in addition to controlling the pace of the testing

Science of Compliance: Implementation

Insight

- Part of what made TQM (Total Quality Management) powerful within the quality movement was the idea that the worker themselves is expected to check and correct any mistake or big enough deviation from the standard
  - Practically, this means the workers should be part of the testing, particularly during the test design phase, even though much of the testing is performed by independent testers
  - The dialogue between the workers and the testers is absolutely necessary to avoid major mistakes in the test design itself

Nth Degree FINANCIAL SOLUTIONS

*Provided by world-renowned implementation expert, Eli Schragenheim

49

Science of Compliance: Implementation

Insight

- Another lesson learned from TQM is the use of control charts to identify and define which deviations from any standard are “normal” and which are truly GAPs
  - This insight also pushes towards prioritization of defects found in testing

Nth Degree FINANCIAL SOLUTIONS

*Provided by world-renowned implementation expert, Eli Schragenheim

50

Science of Compliance: Implementation

Insight

- **Testing involves workers**
- Changes to business processes in Financial Services should be implemented with one or more events involving all the business process associates who actually do the work. It is particularly important to involve them for two reasons:
  - Buy-in, since they will either make it work or not
  - They have knowledge of process details that management and control functions never will

Science of Compliance: Implementation

Insight

- Cultural Change
- When testing, checking, and correcting actions are part of the new "normal" in an organization, it is critical to remember the constructive value of:

Everyone can make mistakes, thus, mistakes have to be clearly forgiven, provided that the lessons have been learned!

Sources: Little's Law from Wikipedia, 2017[1]

- In queueing theory, a discipline within the mathematical theory of probability, Little's law is a theorem by John Little which states:
  - The long-term average number of customers in a stable system L is equal to the long-term average effective arrival rate, λ, multiplied by the average time a customer spends in the system, W; or expressed algebraically: L = λW.
- Although it looks intuitively reasonable, it is quite a remarkable result, as the relationship is "not influenced by the arrival process distribution, the service distribution, the service order, or practically anything else."[3]
- The result applies to any system, and particularly, it applies to systems within systems.
  - So in a bank, the customer line might be one subsystem, and each of the tellers another subsystem, and Little's Law could be applied to each one, as well as the whole thing.
- The only requirements are that the system is stable and non-preemptive; this rules out transition states such as initial startup or shutdown.

1. *Wikipedia: The free encyclopedia*. (2004, July 22). FL: Wikimedia Foundation, Inc. Retrieved July 10, 2017, from https://en.wikipedia.org/wiki/Little%27s_law
3. Simchi-Levi, D.; Trick, M. A. (2013). "Introduction to "Little's Law as Viewed on Its 50th Anniversary"". *Operations Research*. **59** (3): 535.

Sources: Other Material

- Smith, Roy C., Walter, Ingo, Delong, Gayle, Global Banking, Third Edition, Oxford University Press (2012)
- Cecchetti, Stephen G. and Schoenholtz, Kermit L., *Dodd-Frank Five Years After*, June 15, 2015, available at: http://www.moneyandbanking.com/commentary/2015/6/15/dodd-frank-five-years-after
- Office of the Comptroller of the Currency News Release 2014-117, *OCC Finalizes Its Heightened Standards for Large Financial Institutions*
- Federal Financial Institutions Examination Council, *Bank Secrecy Act/Anti-Money Laundering Examination Manual, (2014)*
- FDIC Supervisory Insights, 2006, available at: *https://www.fdic.gov/regulations/examinations/supervisory/insights/sisum07/article01_third-party.html*