Generations of information quality
A practice paper

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Firstlogic, Inc.

Executive summary

Too often beleaguered business and IT and managers struggle with communicating to executives that the organization is suffering from data quality problems. What the managers don't realize is organizational *immaturity* is the root cause of the communication struggle. The executives, the organization as a whole, are unprepared and incapable of hearing the data quality message as presented. A gulf, a perception gap exists between the levels of management and the functions in the organization that must be bridged at the awareness level of senior management, and that of the functional managers – business and IT. The purpose of this presentation is to educate the IT and business managers to the concept of organizational maturity, specifically in regards to information quality. Once the managers understand there are roughly five levels of information quality maturity, and that the messaging, actions, and behaviors change with each level, the managers will be ready to "tune" their communication for the proper reception at the level of their audience.

In support of the above argument we explore the industry maturity cycle, technology diffusion curve, a sampling of existing information quality maturity models, and present a maturity assessment case study. Additionally, we draw parallels to TQM concepts, and touch on the components to an information quality initiative. The ultimate goal of the presentation is to educate business and IT managers as to the cultural issues surrounding information quality, and thus equip them to cope and then change their organization's attitude towards information quality.

Generations of Information Quality

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Rev 1:3

Your Speaker...

Frank Dravis, VP Information Quality
Research and Practice

- 16 years in IT and S/W Development, 13 years specializing in information quality solution design and implementation.
- Responsible for identifying and pursuing strategic information quality opportunities for Firstlogic, in terms of external markets, and internal practices.
- Started in DQ by writing address parsing, assignment, and standardization routines

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What You Will Learn

- Concept of industry maturity levels and adopters
- Information quality (IQ) maturity models
    - Sampling of various models
- IQ maturity level indicators
- Methods for assessing IQ maturity levels
- What to do if you find yourself in a level 1
- Continued evolution of IQ

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Value of Information Quality

- Decreased Operational Costs, Decreased Rework: Greater Efficiency
- Faster Decision Making
- More Accurate Decisions
- Increased Employee Satisfaction
- Increased Customer Satisfaction
- Increased Shareholder Satisfaction
- Greater Effectiveness

Equate to increased productivity, revenue, and profits

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British Telecom Understands IQ

- "Physical assets are increasingly becoming less important in determining the success and valuation of companies. Instead intellectual capital, including the value of information and knowledge assets is becoming the critical determinant of perceived worth of future profitability."

"The Drive to High IQ in British Telecommunications. Deploying Information Quality Tools in a Federated Business," MIT IQ 2000 conference

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Famous Failures

- NASA Challenger: o-ring seals out of tolerance
- Ford Pinto: poorly design gas tanks
- Exxon-Valdez: single-hull tanker grounding
- Three Mile Island: inadequate emergency response training
- Piper Alpha oil rig: lack of blast wall protection

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Organizations That Did Not Listen

- All had people in their organizations that warned
- Why did they fail?
  - Because their organization, management and culture was not ready (willing) to hear and act what they said
- The organization was immature in some regard
  - Whether it was a safety, environmental, quality, or cost issue
- They had not learned when one of their own tried to teach

Have you ever felt like you were the one being ignored?

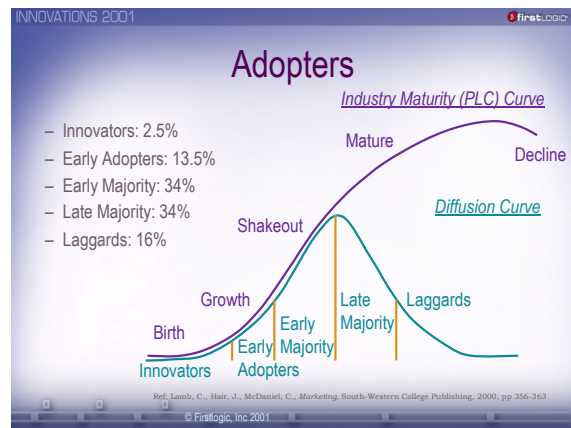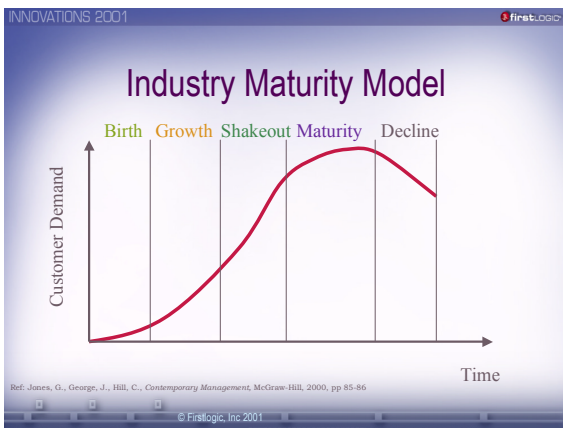© Firstlogic, Inc 2001

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The Benefits of Knowing
IQ maturity progression

You will...
- Know why senior management has not been listening
- Be aware some organizations are farther ahead
- Understand the behavior of an organization
- Have a framework to change your organization
- Know the actions to pursue as your IQ evolves

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Industry Maturity Model

Birth   Growth   Shakeout   Maturity   Decline

(y-axis: Customer Demand; x-axis: Time)

Ref: Jones, G., George, J., Hill, C., *Contemporary Management*, McGraw-Hill, 2000, pp 85-86

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Adopters

Industry Maturity (PLC) Curve

- Innovators: 2.5%
- Early Adopters: 13.5%
- Early Majority: 34%
- Late Majority: 34%
- Laggards: 16%

Mature   Decline

Diffusion Curve

Shakeout

Growth   Late Majority   Laggards

Birth   Early Majority

Innovators   Early Adopters

Ref: Lamb, C., Hair, J., McDaniel, C., *Marketing*, South-Western College Publishing, 2000, pp 356-363

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IQ Maturity Models

- CIO Magazine
  - Stage 1, Denial
  - Stage 2, Acceptance
  - Stage 3, Leverage
  - Stage 4, Webification

- Tom Redman, Navesink Consulting

Ishikawa notes that Quality Systems Evolve

Third Generation: Design renders defects "impossible"

Second Generation: Process Management to prevent defects

First Generation: Inspection and rework to find and fix defects

Ref: Stackpole, B., *Wash Me*, CIO Magazine, February 15, 2001, pp 101-112

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IQ Maturity Model

Philip Crosby, Larry English
- Level 1: Uncertainty
- Level 2: Awakening
- Level 3: Enlightenment
- Level 4: Wisdom
- Level 5: Certainty

A software development version:
- Carnegie and Mellon's SEI CMM

Crosby, P., *Quality is Still Free*, McGraw-Hill, 1996, pp 31-55; English, L., *Improving Data Warehouse and Business Information Quality*, Wiley, 1999, pp 427-450

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A New Maturity Scale

Level 1: Asleep. House is on fire.
Level 2: Awake. Smell smoke.
Level 3: Panic. Put the fire out!
Level 4: Fire's out. Don't want another.
Level 5: Fire resistant. Won't have another.

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Level 1: Asleep
Feeling no pain

- Management Perceptions
  - ¬ No awareness of IQ value
  - ¬ They have NO data problems
  - ¬ Believe information is domain of IT

- Infrastructure
  - – No quality org, except in IT dev.
  - – No IQ metrics taken or published

- Management Behaviors
  - ¬ Faults IT when problems are exposed
  - – IT faults business for app failures
  - ¬ Finger pointing
- Actions
  - ¬ Cover ups, criticisms, and back-biting
  - ¬ Information workers frustrated to point of apathy
  - ¬ 20% of revenue spent on scrap and rework

Adapted from Philip Crosby and Larry English

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Level 2: Awake
Felt some pain, might go away on its own

- Management Perceptions
  - ¬ Aware of an IQ problem; caused by a catastrophic failure
  - ¬ Unsure of size of problem, or persistence
  - – Poor IQ has cost them something

- Infrastructure
  - ¬ adhoc team established to clean up
  - – An IQ manager may be appointed

- Management Behaviors
  - ¬ Want to fix problem
  - ¬ Reluctant to spend on problem
  - ¬ IT assigned to fix problem, but within current budget
- Actions
  - – No change in processes or mgt.. systems
  - – Clean up of specific problem
  - – Cost of clean up effort is tracked
  - ¬ Some scrap/rework eliminated
  - ¬ 18-16% of rev spent on scrap and rework

Adapted from Philip Crosby and Larry English

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Level 3: Panic
Oh boy, we're feeling some pain now

- Management Perceptions
  - ¬ Information problems will not go away
  - ¬ Must re-evaluate corporate position on value of IQ
  - – Everyone accountable for IQ

- Infrastructure
  - ¬ Formal, cross-functional group(s) established for IQ
  - ¬ Adhoc business group focused on data standards

- Management Behaviors
  - – Actively learning about IQ
  - – IQ initiatives are sponsored
  - – Funding established for IQ initiatives
  - – Directs processes to be permanent
- Actions
  - ¬ Business and IT are coordinating on information issues
  - ¬ Data quality assessments conducted
  - ¬ Root cause of problems sought
  - – Long-term solutions implemented
  - ¬ 15% of rev spent on scrap and rework

Adapted from Philip Crosby and Larry English

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Level 4: Fire's Out
Felt enough pain, and are tired of it

- Management Perceptions
  - ¬ Significant benefits come from IQ
  - ¬ Substantial impact of IQ on bottom line
  - ¬ Sr. Mgt. is accountable for IQ
  - ¬ IQ is tied to customer satisfaction

- Infrastructure
  - ¬ Everyone in the organization is involved in a formal or informal IQ activity
  - ¬ CIO is accountable for technical enablement of IQ

- Management Behaviors
  - – Ensures continued implementation and maturation of IQ processes
  - ¬ Consumers of information are considered customers
  - ¬ Cultural obstacles to IQ are addressed
  - ¬ IQ metrics are added to KPIs
- Actions
  - ¬ Business/IT partnerships are defacto
  - – App., data, and business processes are designed with IQ as a requirement
  - ¬ Defect prevention is a norm
  - ¬ 10% of rev spent on scrap and rework

Adapted from Philip Crosby and Larry English

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Level 5: Fire Resistant
Feeling little pain, and want to keep it that way

- Management Perceptions
  - ¬ Folly to conduct business without IQ management in place

- Infrastructure
  - ¬ IQ management mentors and trains Bus/IT teams
  - ¬ Assures new systems are design with quality in mind

- Management Behaviors
  - – New IQ problems fixed immediately
  - – Employees incentivized to look for issues
  - ¬ Compensation elements tied to IQ
- Actions
  - – Measures lifetime value of customers
  - – Most IQ failures caused by external events
  - – Audits performed on process/sys design
  - ¬ 5% of rev spent on scrap and rework

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Slide 1: Maturity Assessment

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Maturity Assessment

- Don't need metrics or measurements
- Do need cross-functional input and perceptions
  - Acct., Mktg., Admin., Sales, Mnfg, Shipping, R&D, *and* IT
- Survey, who's purpose is to determine:
  - Perceived importance of data quality to organization
  - Data steward's perceptions of current data quality
  - Data consumer's perceptions of current data quality
  - Policies and responsibilities to cleanse operational data
- Don't use personal attribution in the findings

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Slide 2: Awakening A Level 1

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Awakening A Level 1
Level 1s need the most help, and they predominate

- The survey starts the process
- Document the information issues
- Pick the top issue and assess impact
- Educate management that they are feeling pain
- Be ready with a proposed solution
- Appoint an IQ smoke detector

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Slide 3: IQ Maturity Case Study: FGV

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IQ Maturity Case Study: FGV

- Personal interviews of 8 people
- 2 Senior managers
- 1 IT manager, 1 IT analyst
- 3 Business managers
- 1 Customer support manager
- Wanted a strong cross-section to smooth anomalies, agendas

- Asked 80 questions
- Questions mapped against 59 individual maturity indicators
- Questions constructed to show continuity and affirmation

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Slide 4: FGV Assessment

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FGV Assessment

FGV assessed at Level 3 with caveats
  - No formal, cross-functional IQ groups established
  - Root cause of problems not always sought
  - Long-term solutions not always implemented
  - Cost of clean-up efforts not tracked

Average estimated % of time spent on rework: 19.7%
  - Percent of time working with information

Weak indicators leading to the next level were positive signs of maturity growth, rather than maturity regression

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Slide 5: Assessment Insights

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Assessment Insights

- In some cases existing cynicisms prompted overly critical judgments.
- Some perceptions were completely wrong according to facts.
- Perception gaps existed between mgt levels, and business and IT.
- The gap hindered effective and joint planning of IQ initiatives.
- Lower mgt. was often unaware of senior mgt. Intentions.
- Three types of personnel found: business, IT, and boundary.
- Personnel involved in long-standing IQ activities no longer see them as such (SOP).
- Assessments identify important, future cross-functional IQ initiatives.

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Slide 6: Matrix Perception Gap

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Matrix Perception Gap

Attitude Tendencies

	Business	Boundary	IT
Senior Mgt	Learning	Realistic	Aware
Line Mgt	Critical	Realistic	Defensive
Workers	Negative	Realistic	Positive

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Actions
to Speed Maturity Progression

- Establish forums for business and IT management to share perceptions and engage in dialog. **Close the perception gap.**
- Establish regular, multi-channel, wide-spread communication of IQ activities. **Eliminate perception inaccuracies.**
- Senior mgt. vigorously participate in communication. **Remove any doubt as to position and intentions.**
- Identify and increase number of liaison personnel. **Promotes communication, flow of information, and common perceptions**

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IQ Initiative Fundamentals

- Be aware that IQ is a cultural issue
- Start with a pilot
- Pick an information issue where pain is apparent
- Research the problem, and then the solution
- Find your sponsor
- Understand the perception gap
- Don't assume you need a hard ROI

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IQ Initiative Specifics

- Determine importance of data quality to organization (*accomplished via maturity survey*)
- Determine data owners' perceptions of current data quality (*maturity survey*)
- Determine down-stream users' perceptions of current data quality (*maturity survey*)
- Determine policies and responsibilities to cleanse operational data (*maturity survey*)
- Establish a cross-functional IQ team to resolve disputes

Moss, L., Method Focus Inc., *Dirty Data* presentation to Firstlogic, Inc., 2001

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IQ Initiative Specifics (cont)

- Create a process to include down-stream data users in operational system requirements and analysis sessions
- Create a policy for logical data modeling
- Create a policy for meta data capture (business & technical)
- Create a policy for a central DW staging area
- Assemble and train a team to regularly assess the quality and the consistency of operational and DW data

Moss, L., Method Focus Inc., *Dirty Data* presentation to Firstlogic, Inc., 2001

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IQ Initiative Specifics (cont)

- Establish procedures for prioritizing which data to cleanse first (and where)
- Establish procedures for rejecting or suspending dirty data
- Review and revise existing data standards
- Incorporate new standards into the development methodology
- Change incentive policy to include accountability for data quality
- Manage data like any other resource in the company

Moss, L., Method Focus Inc., *Dirty Data* presentation to Firstlogic, Inc., 2001

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IQ Parallels to TQM

1. Build organizational commitment to quality:
   Includes your information
2. Focus on the customer:
   Information consumer
3. Find ways to measure quality:
   In your information
4. Set goals and create incentives:
   For the management of information
5. Solicit input from employees:
   Uncover their issues and ideas for information

Ref: Jones, G., George, J., Hill, C., *Contemporary Management*, McGraw-Hill, 2000, pp 655-659

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IQ Parallels to TQM

6. Identify defects and trace them to their source:
   Where did the defective data come from?
7. Introduce just-in-time inventory:
   Information when people need it
8. Work closely with suppliers:
   Those who produce your information
9. Design for ease of manufacture:
   Ensure information accuracy first
10. Break down barriers between functions:
    Information transcends functions

Ref: Jones, G., George, J., Hill, C., *Contemporary Management*, McGraw-Hill, 2000, pp 655-659

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Favorable IQ Factors

- When the Company Has a Commitment to Quality
  - Malcolm Baldrige, TQM, CMM, ISO
- When Data is a Success Factor to an Important Project
  - Data creation, usage, integration, and reporting
    - Business intelligence (BI), analysis, decision support
    - Customer Relationship Management (CRM), Enterprise Application Integration (EAI)
    - B2B, E-commerce
    - Merger/Acquisition
    - Project planning, application development, configuration and change management
- Quality Control is a Mandate
  - Government Inspection (FDA, SEC, DOD, USPS: *CASS, PAVE, SERP*)

Ref: Forino, R., DMR Consulting

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Demands of Your Customers

- Your customers, patients, or passengers will drive you harder for information than you will drive yourself. Use those demands to propel your organization's IQ initiative.

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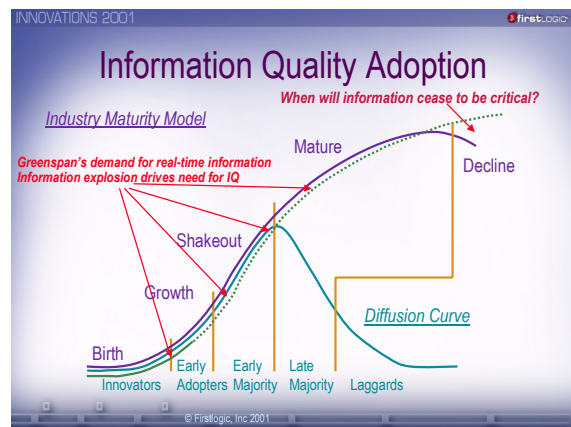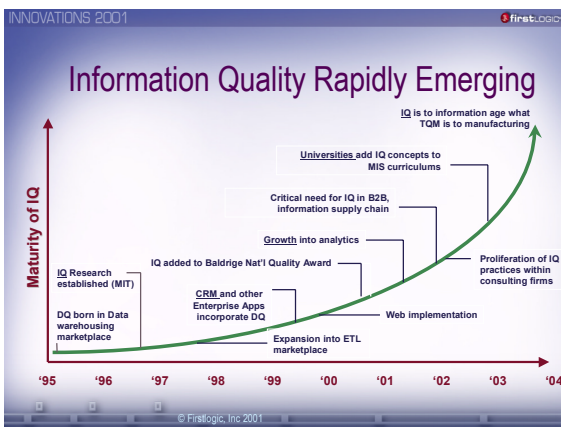

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Establish Information Goals
What is your key business driver?

Examples:
- Achieve a single view of the customer
  - More effective communication, better relations, better management of accounts
- Calculate the life-time value of any customer
  - Who are the top 20% of your customers generating 80% of your revenue?
- Accurately segment revenue/earnings per your vertical markets
- Information reporting done at a click of a button
  - Get operational reports within minutes of when you need them
  - Eliminate subordinate "scurry" as they scramble to acquire data and build reports
- Reduce operational costs
  - Consolidate redundant data and data stores. Reduce rework via better production processes.

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Information Quality Rapidly Emerging

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Information Quality Adoption

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The Benefits
of knowing IQ maturity evolution

You...

- Understand why senior management has not been listening
- Are aware organizations function at different levels
- Understand the behavior of your organization
- Have a framework to change your organization
- *Know the actions to pursue as your IQ evolves*

"Seek first to understand, then to be understood."
--Stephen Covey

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In The End

Your information can be either your competitive advantage, or disadvantage.

It will be one or the other.

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Business Strategies for Success

Questions

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Capability Maturity Model

Continuous process improvement → **Level 5: Optimizing**

Process control → **Level 4: Managed** ← Change management

Common processes → **Level 3: Defined** ← Quantitative management

Stabilize environment → **Level 2: Repeatable** ← Engineering management

Level 1: Initial ← Project management

TeraQuest Inc, CMM Assessment Final Findings presentation to Firstlogic, Inc., March 1999

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