IMPROVED FAGAN INSPECTION

with **Calibrated** PASS/FAIL Limits

And

CONTINUOUS PROCESS IMPROVEMENT

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SYNOPSIS:
Improved Fagan Inspections and Continuous Process Improvement.

- More than 50% of Development effort is used for Rework, mostly to fix defects.
- Defects found after integration of code require **10X** more effort (P.Hours) to rework than if they are found near their point of origin.
- **FAGAN INSPECTIONS** {Whose process is very disciplined and should not be confused with partial implementations or reviews.} detect **70 – 90% of life-cycle Operational defects before any testing.**
  - Reduce development time by up to 30% -- Including Inspection effort.
  - Reduce Shipped Defects by 10X
  - No projects have missed their ship dates. Most are ready sooner.
  - ROI: 3 to 15 : 1
  - Requires 3 days of dedicated training, implementation on day after class.
  - > 100 companies, Thousands of Fagan Inspections
  - See Michael Fagan Associates' website, "What our clients are saying."
- **Continuous Process Improvement removes causes of repetitive defects.**

TYPICAL RESULTS REPORTED BY CLIENTS:

- Very high acceptance by engineers WHEN DISCIPLINE IS REQUIRED AND SUPPORTED BY MANAGEMENT.
- Increased Professional Satisfaction in Engineers & Testers.
- **Fastest way to learn product!**
- Shorter time to ship OR added function on committed ship date.
- 10X Reduction in Shipped Defects (➔ Reduced Service.)
- ROI of Fagan Inspections, Pre-Shipment, 3 to 15 : 1 … reported
- See "What Our Clients Say" on mfagan.com
- NO ONE HAS MISSED A SHIP DATE.

Example: What is Agile Business Suite?

- **Unisys-developed software product that is used to build business-critical, transaction-oriented solutions using industry-popular and industry-standard technologies**
- **With Agile Business Suite, developers define the solution in high-level terms focusing on the business rather than the implementation aspects of the solution**

Optimized to build and *maintain* mission-critical, "bet your business" applications, in any line of business

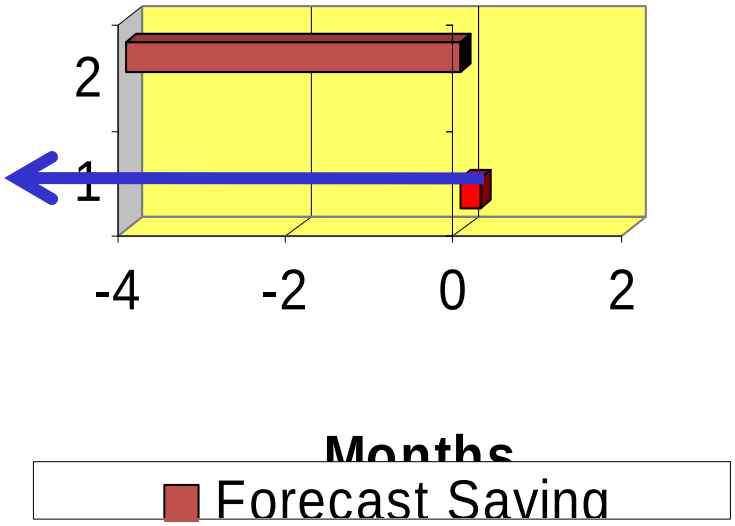
- **Public sector, financial, commercial, communications, etc…**

Return on Investment

- Project team, experienced AGILE users in past releases, added FAGAN Inspections

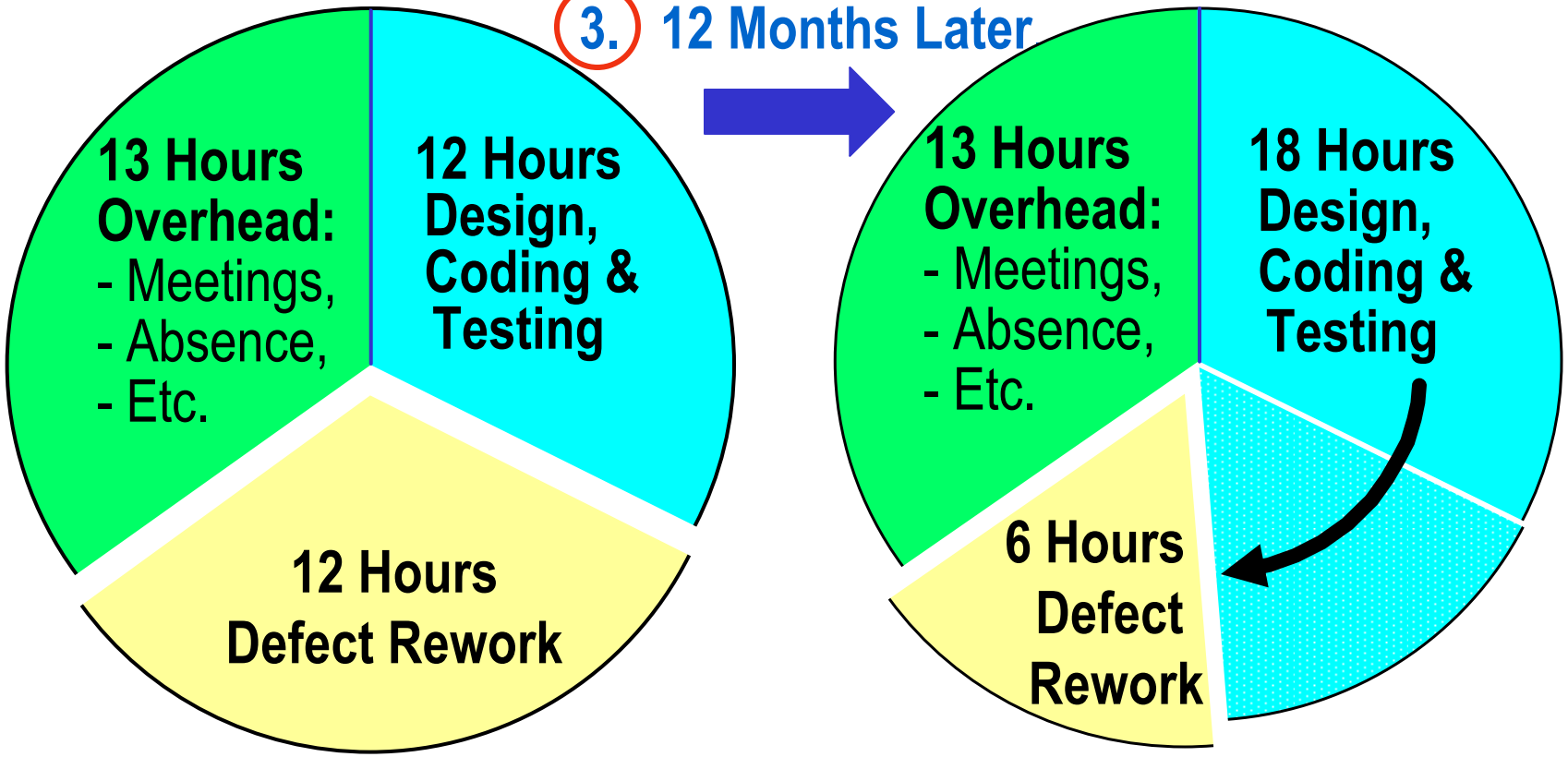
Inspection Effort	
Effort Spent	0.53 man years
Projected Saving	8.2 man years
ROI	1 : 15.5

Schedule	
Size of Team	25
Additional Extension	0.25 months
Project contraction	4 Months



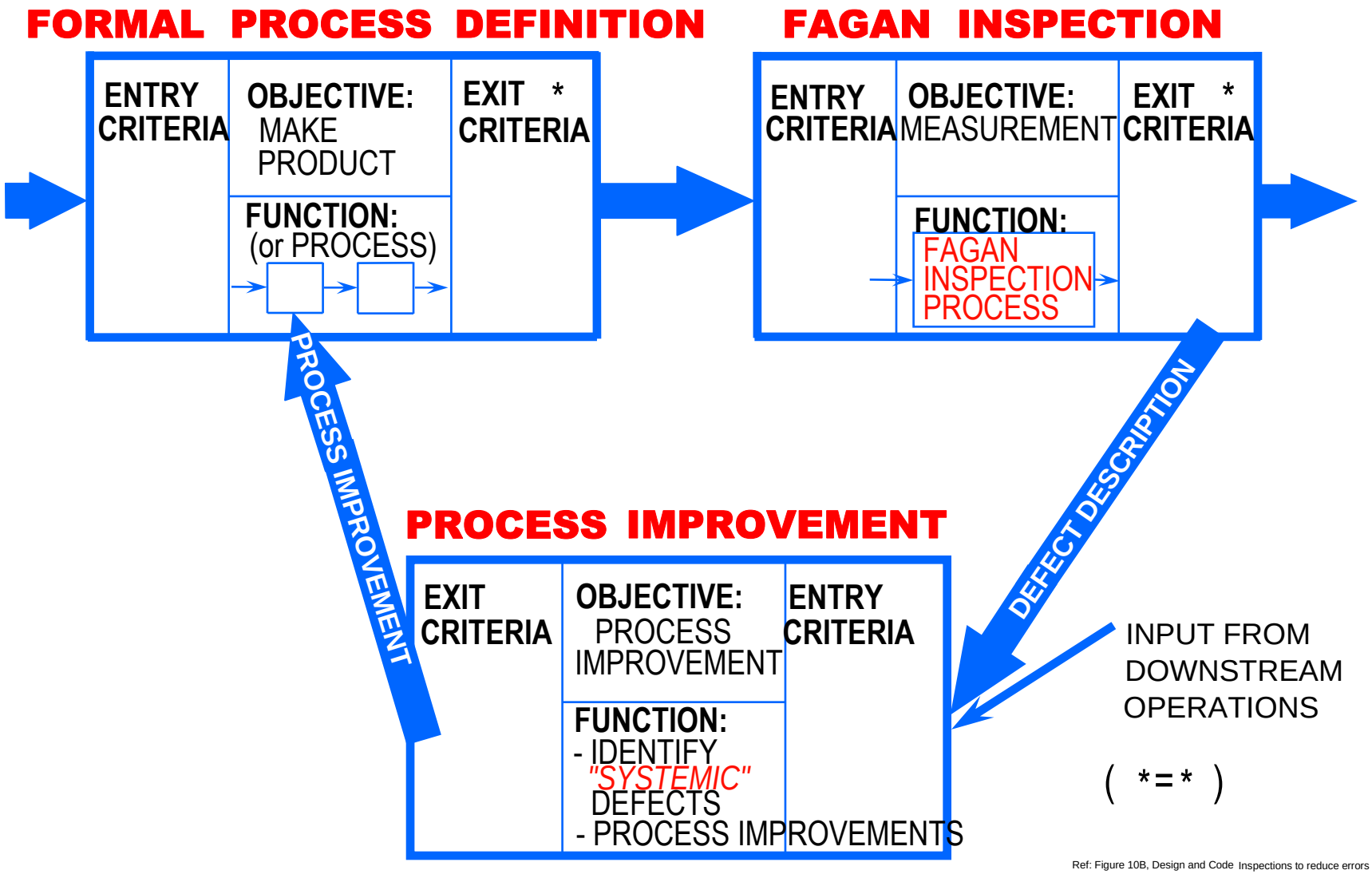
HOW ONE ORGANIZATION INCREASED PRODUCTIVE TIME by 50%:

1. Work Breakdown Measurement (normalized to a 37 hour work week).
2. **Defect Rework** Reduction using the FAGAN DEFECT-FREE PROCESS.
3. 12 Months Later.



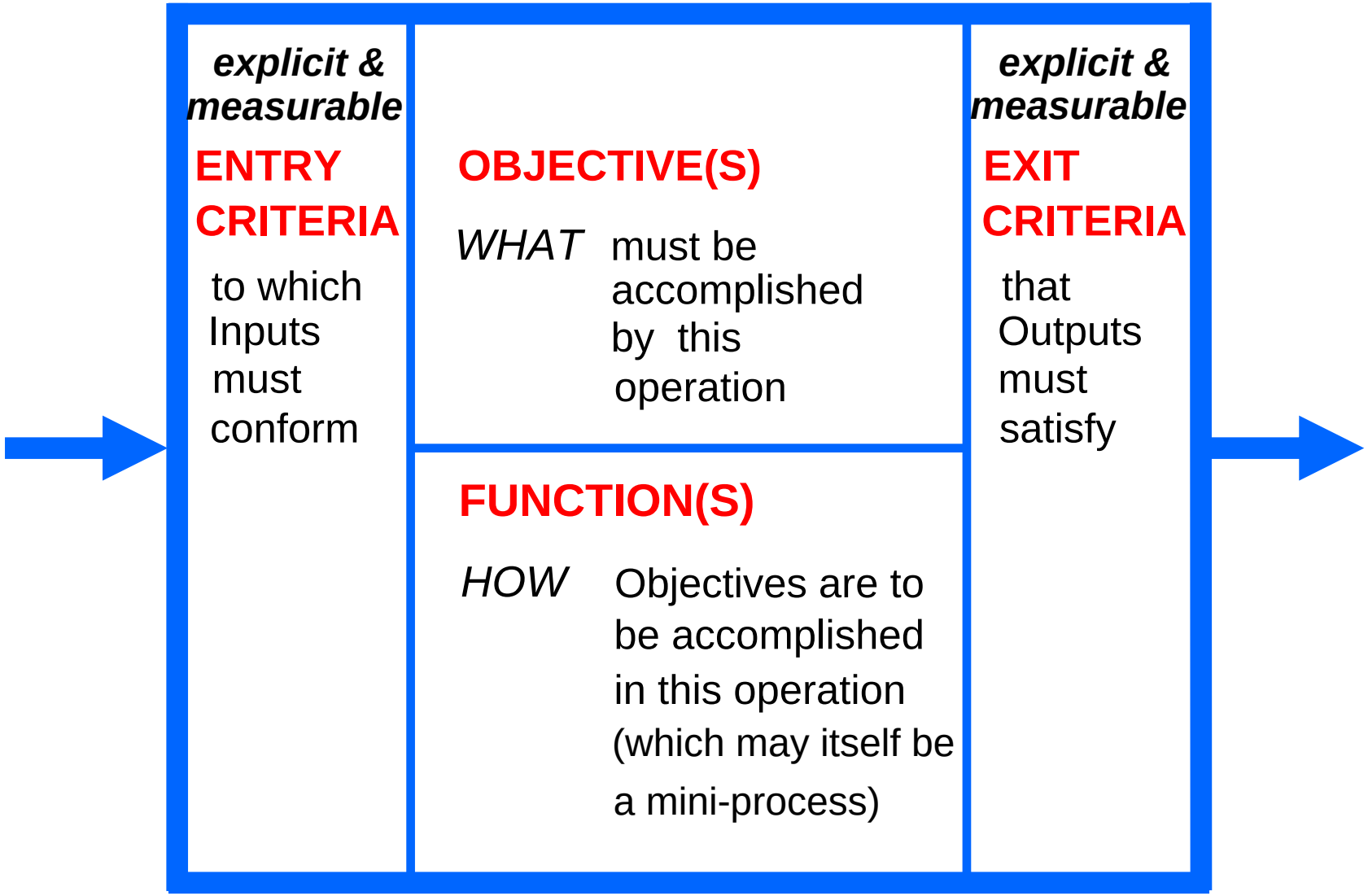
Study in a UK company, 1999-2000.

FAGAN INSPECTION & CONTINUOUS PROCESS IMPROVEMENT



Ref: Figure 10B, Design and Code Inspections to reduce errors in program development, by M.E.Fagan, IBM Systems Journal, Vol.15, No.3, 1976.

FORMAL DEFINITION OF A PROCESS OPERATION



IMPROVED FAGAN INSPECTION PROCESS

- **7 OPERATIONS**
- **4 INSPECTOR ROLES**
- **RULES OF EXECUTION**
- **“CALIBRATING” INSPECTIONS using INSPECTION EFFECTIVENESS FACTORS**
- **CASE STUDIES - CODE, REQUIREMENTS**

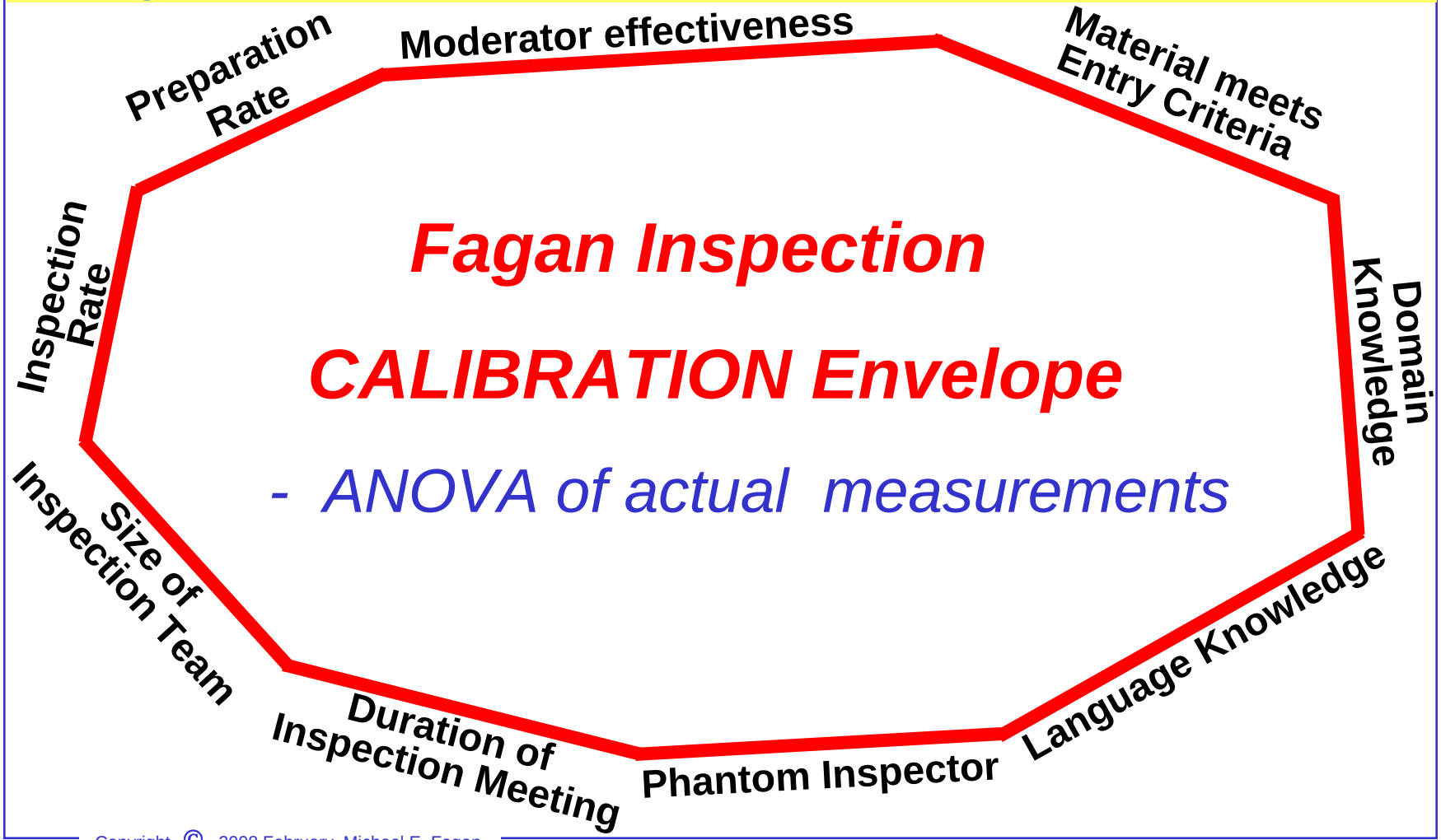
FAGAN INSPECTION - a seven stage process based on the FAGAN DEFECT-FREE PROCESS

Role Based Inspections

Moderator	**Lead, encourage, build team synergy** **Record defect descriptions and severity**
Author	**Active Inspector, find defects** **Encourage finding of defects, Non-defensive**
Reader	**Paraphrase every statement of code or text** **(Posture: "I am the new owner, let me explain")**
Tester	**Examine and question from a Tester's viewpoint** **(Posture: "Can I write a test plan, cases to test it")**

CALIBRATION OF INSPECTION TO FIND DEFECTS

Using INSPECTION EFFECTIVENESS FACTORS



INSPECTION EFFECTIVENESS FACTORS:

NOTE: This is a means of calibrating the effectiveness of inspection.

Team estimate - select a figure within the range:

- MATERIAL MET INSPECTION ENTRY CRITERIA **1_____10**

  Code: "Clean compiled;" Satisfied Standards; Size: ≤250 LOC; Inspected Design, Req'mts; Line #'s; Cross-Ref; Overview Diagram; & LINT.
  Text **Documents** (e.g., Requirements, Design or Test Plans): Satisfied Standard Format; Size: ≤280 Text Lines; Overview Diagram; Text Line #'s; inspected initiating documents (e.g., Proposal, Contract, etc.); and supporting documents.

- INSPECTORS' KNOWLEDGE OF CODING LANGUAGE **5_____10**

  4 Inspectors with knowledge of coding languages = 10; 3 Inspectors = 5; *<3 Inspectors=Cancel Inspection*
  If natural language prose text is inspected, score 10. If a special notation or other language is used, apply code scoring method.

- INSPECTORS' KNOWLEDGE OF PRODUCT (DOMAIN) **1_____10**

  4 Inspectors with product knowledge = 10; 3 Insp = 8; 2 Insp = 6; 1 Insp = 3; 0 Insp =1.

- DURATION OF INSPECTION MEETING Up to 2 Hrs = 10; >2 Hrs = 5. **5_____10**

- PREPARATION RATE (See PREPARATION RATE CALCULATION.) **0_____10**

  Code: ≤ 100 LOC/Hr., or Text **Documents**: ≤140 TEXT Lines/Hr. = 10.
  Higher rates: 9 ranging downward to 0 at 200 LOC/Hr and 280 LOT/Hr, as rate is increased.

- RATE OF INSPECTION (See INSPECTION RATE CALCULATION.) **0_____10**

  Code: ≤125 LOC/Hr., or **Text Documents:** ≤140 TEXT Lines/Hr. = 10**.**
  Higher rates: 9 ranging downward to 0 at 250LOC/Hr and 280 LOT/Hr, as rate is increased.

- SIZE OF INSPECTION TEAM **5_____10**

  Code: 4 Inspectors = 10; 3 Inspectors = 8; >4 Inspectors = 5. *If <3 inspectors, cancel the inspection.*
  Requirements/Docs.: 4 Inspectors = 10; 3 or > 4 Inspectors = 5. *If <3 inspectors, cancel the inspection.*

- PRESENCE OF "PHANTOM INSPECTOR" **1_____10**

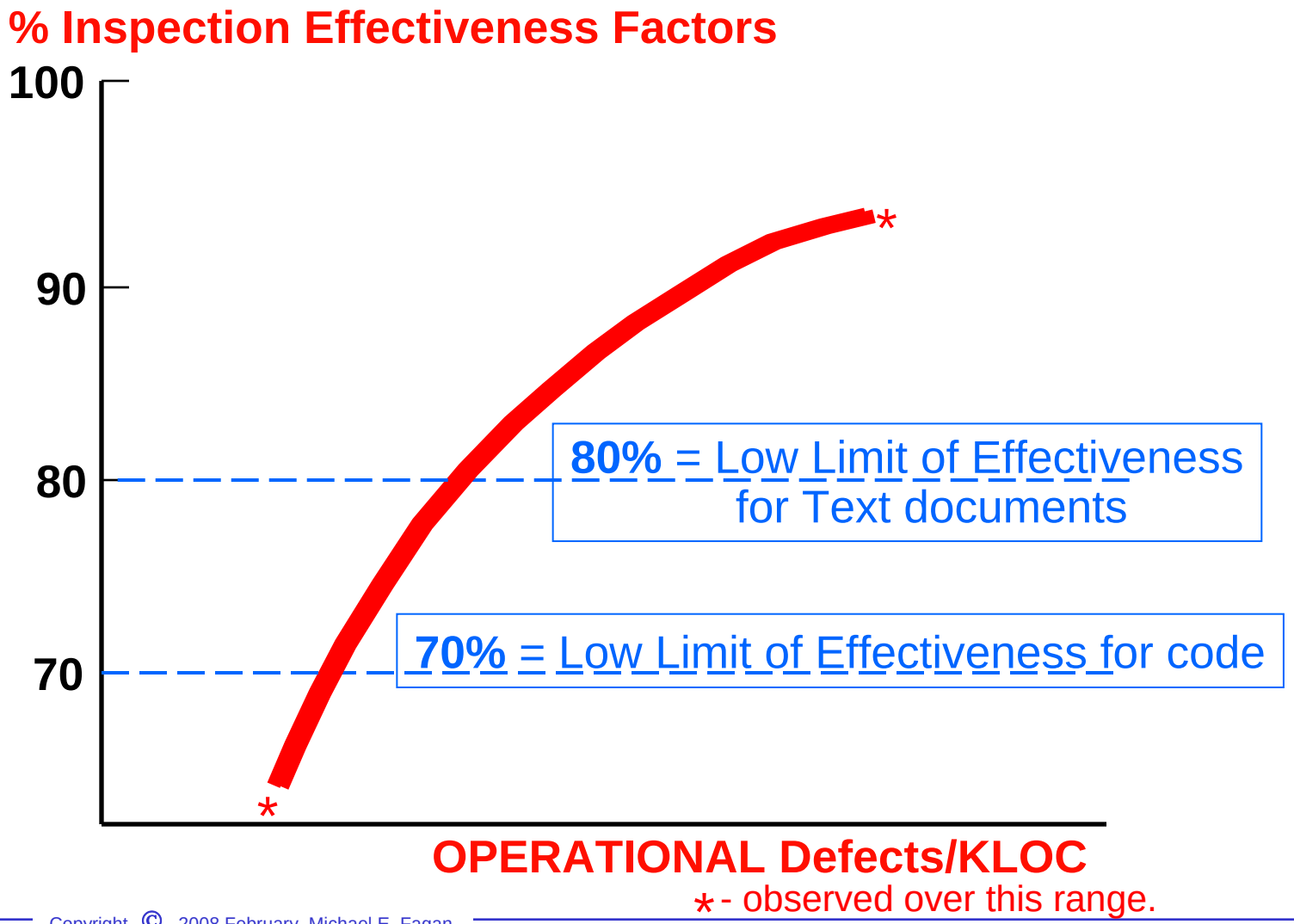
  Team Synergism: When the team works together in a highly interactive manner and each of the inspectors properly fulfills their roles, the team members build upon each others knowledge. This creates a synergy, the pooled knowledge being larger than the sum of the contributions by the individuals. This allows the team to find more defects than if the inspectors had acted independently. (See Phantom Inspector, Objective and Function.)

- MODERATOR EFFECTIVENESS **(From worksheet)** **1_____20**

  For the first 5 inspections, >10 is very unlikely!

- **EXECUTION OF EFFECTIVENESS FACTORS (BAROMETER) : ____ %**

INSPECTION EFFECTIVENESS FACTORS and OPERATIONAL DEFECTS/KLOC DETECTED



Example: Results from a class that inspected their own real product code.

CODE INSPECTION ECONOMICS - NET SAVINGS:
FINDING DEFECTS BY CODE INSPECTION vs. SYSTEM TEST

The experience of this class inspecting **real product code**:

- LOC INSPECTED: _1127
- OPERATIONAL DEFECTS FOUND: _13

NOT including any of the _7_ INVESTIGATE items that may become OPERATIONAL defects after investigation.

- ESTIMATED TIME TO REWORK and FOLLOW-UP

  ALL OPERATIONAL DEFECTS – found by code inspection: _19 Staff Hours(1.5/OP)

- TOTAL INSPECTION TIME __33 Staff Hours

  ([15 minutes of Planning +Overview + Prep + Insp] x Number of inspectors)

- TIME TO REWORK A DEFECT FOUND IN SYSTEM TEST: _17.8 Staff Hours

- **NET SAVINGS REALIZED IN THIS CLASS: _179.4 Staff Hours**

  (#OPERATIONAL defects x Time to rework a System Test defect - Total Inspection Time - time to Rework all OPERATIONAL defects found by code inspection.)

- **BREAK-EVEN - If inspection had found only __2 Operational defects**

  (Total inspection time / [Fix time for a system test defect - Average rework time for OPERATIONAL defects found by inspection])

- **Can translate into shipping sooner by: __0.9 Days**

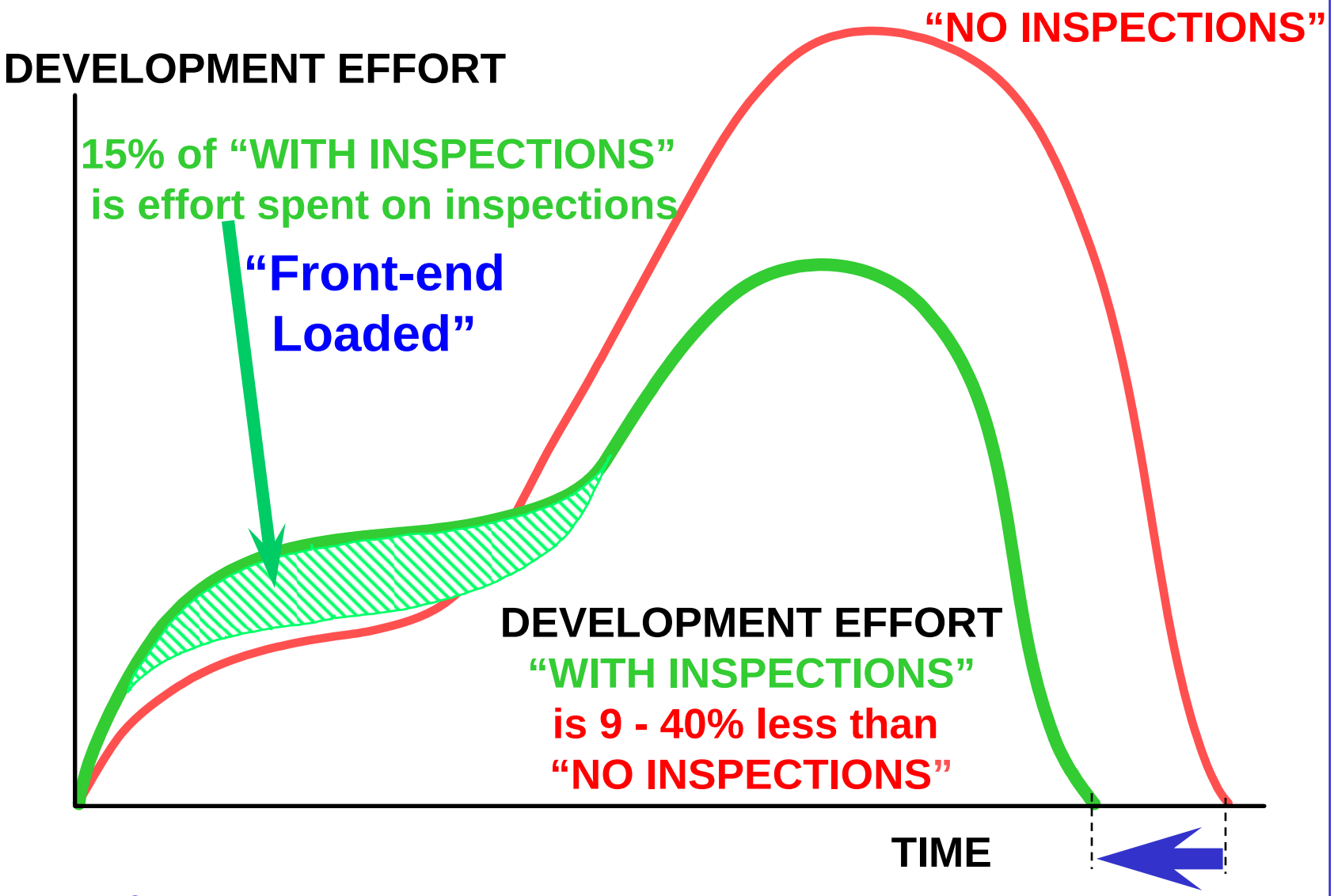
  (NET SAVINGS / [Number of inspectors x 8 Hours])

- **Return On Investment, ROI : __4.5 to 1**

  (No. of Operational Defects x Time to Rework a System Test Defect / [Total Inspection Time + Time To Rework All Operational Defects])

Date: ____/2008 Company / Location: ----------/----------

TYPICAL NET REDUCTION OF EFFORT WITH INSPECTIONS



“This FAGAN DEFECT-FREE PROCESS course addresses Many of the “how to’s” and builds the skills for achieving SEI Level-3, - 4, and - 5.”

- Russ Campbell

Level 4 Initiative SEPG Process Improvement Team,
Lockheed Martin Tactical Aircraft Systems, Ft. Worth, Texas.

“I have never seen a course like this - where the students sell the class to their peers and management to the extent that others compete to get the training.”

- Ed Renner,

Manager of Mission Planning Systems (and member of the SEI Level 4 Initiative)
Lockheed Martin Tactical Aircraft Systems, Ft. Worth, Texas.

Successful Implementations have been initiated by management.

Processes that have been kept effective by continuous management attention.

{Remember, this not like buying and installing a software tool; it is a process involving engineers and managers who need to see and continuously feel that their management want them to perform effective inspections.}

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