

***Fagan Inspection: The Silver Bullet No-one
Wants to Fire***

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Objectives of this presentation

(Prompted by an observation at a previous London SPIN meeting that effective Fagan Inspections are a rarity.)

- Describe what Fagan Inspections are, what's involved, and what's expected of inspectors and others
- Present evidence to show how effective they can be
- Explore why they are rarely performed, with a view to resolving this

What are Fagan Inspections?

- Invented in the early '70s by Michael Fagan of IBM
 - Inspired by production engineering inspection
- A widely applicable, rigorous and formal software *engineering* QC technique
 - Inspection of any document when it is believed *complete* and *ready for use*
 - Finds defects (directly – unlike testing, which happens later, and only reveals symptoms)
- Related to, but distinct from, walkthroughs, technical reviews, 'buddy checking', email 'pass around' or 'postal' reviews
- One of the 'catalyst' processes...

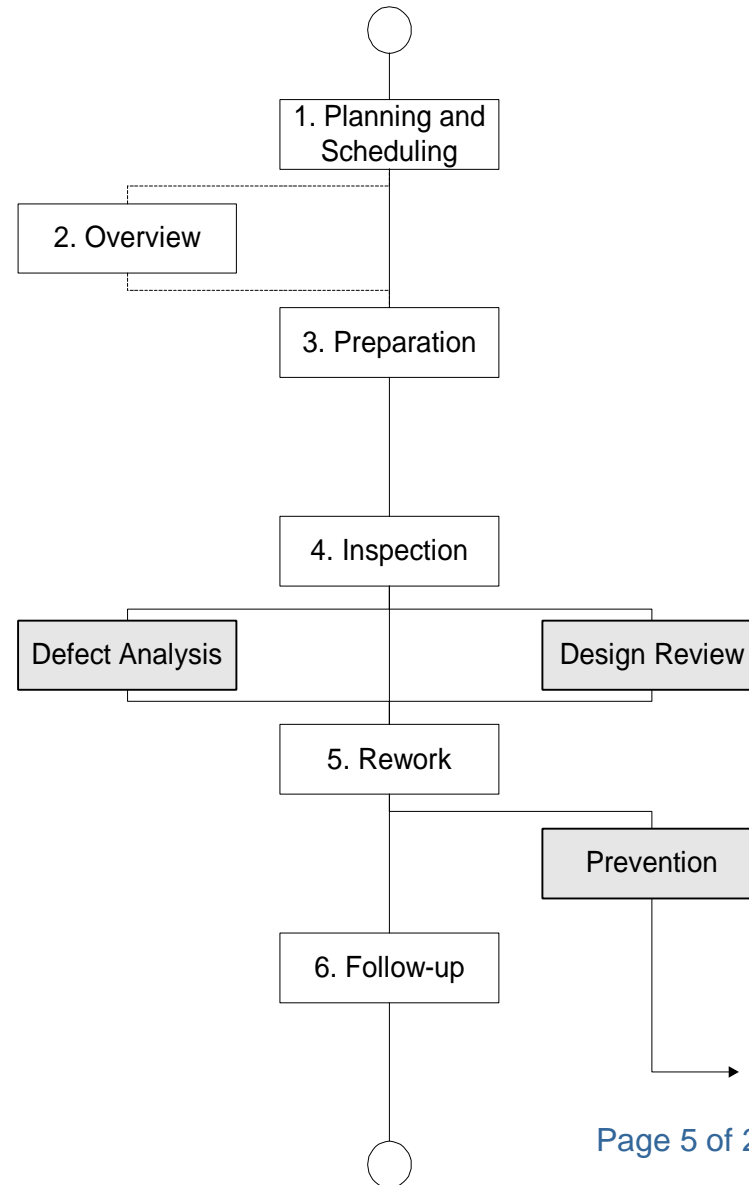
The I_1 process consists of four stages and optionally a fifth stage (Overview): (See Attachment I)

1. Overview
2. Preparation for Inspection
3. Inspection
4. Rework
5. Follow-up

The overview is a meeting in which the designer explains the design to all participants in the inspection. Normally the overview is given prior to the I_0 inspection; however, if no I_0 was conducted, the overview will be given prior to the I_1 .

text from IBM TR 21.626, p9

The Inspection Process



Inspection Characteristics:

- Budgeted, planned and scheduled
- Use a defined process
- Use knowledgeable peers...
- ...trained to perform defined inspection roles
- Have defined entry and exit criteria
- Use checklists and standards
- Primary purpose is to find defects, for removal

Why do Fagan Inspections? - 1

- Benefits:
 - Very high defect detection effectiveness - ***the single most effective software quality control***
 - Widely applicable – to all documents – developed, changed or acquired
 - Can be used early in development (to reqs. docs.) and throughout development work
- There is a well documented track record of reductions in rework costs, and defects in released software:

Why do Fagan Inspections? - 2

COMPANY	COST IN INSPECTIONS	COST IN TEST	COST WITH CUSTOMER DISCOVERY	SOURCE
IBM	\$48/defect	\$61-\$1030/defect		[NOR78]
AT&T	1 unit	20 units	-	[EIS85]
ICL	1.2-1.6 hours/defect	8.47 hours/defect	-	[KIT86]
AT&T	1.4 hours	8.5 hours	-	[ACK89]
JPL	\$105/defect	\$1700/defect	-	[BUS90]
IBM	1 unit	9 times more	117 times more	[LIN91]
Shell	1 unit	30 units	-	[DOO92]
Thorn EMI	1 unit	6.8 – 26 units	96	[GIL93]
Applicon Inc	1 hour	-	30 hours	[SPE94]
Infosys	1 unit	3- 6 units	-	[JAL00]

From Radice, 2002

Why do Fagan Inspections? - 3

Work Product	Estimated Starting Point	Estimated 1994	Total Costs Saved	Rework	Estimated Savings Per Yea
Specifications	1%	34.3%	33.3%	17%	\$14,860,000
Design	1%	40.0%	39.0%	11%	\$11,261,000
Code	5%	48.1%	43.1%	4%	\$4,526,000
Test Plans	1%	18.7%	17.7%	1%	\$465,000
Total				33%	\$31,112,000

from Grady 1997

'Additional' Benefits - 1:

- Technical
 - Provides early and ongoing data on effectiveness of ways of working (for SPI – ‘backward control’)
 - Provides early and ongoing data on quality of work performed or artefacts acquired (for project management - ‘forward control’)
 - May reveal excellent or novel solutions for use in project - or else where

- Project and Management
 - Signals readiness of artefact for baselining and use
 - Signal completion of task to produce artefact – and trigger for Earned Value (re)calculation
 - Improves team and cross team awareness of product readiness and work synchronization
 - Shares technical understanding and reduced resourcing dependencies and bottlenecks

'Additional' Benefits - 2:

- Professional
 - Originators learn to, and do, produce higher quality artefacts
 - Inspectors (esp. younger professionals and new hires) share learning and understanding of domain and de facto work standards
 - Inspectors develop (and are seen to develop) a technical critical faculty
 - Encourage collaborative working and team building (unit of production is the team)

(Not bad for such an apparently simple process - because this is the carefully *managed, structured and focussed* application of *several intelligent agents* to the *quality control of unique design artefacts* – and this is unusual)

So - why are Fagan Inspections so rarely used or used successfully?

(...given that they *can* be so effective)

...this is not a rhetorical question. What do you think?

Reasons for very limited use of Fagan Inspections:

- Professional Ignorance:
 - not heard of them (why?)
 - assumed to be a synonym for 'review'
- Organizational Ignorance:
 - culture works against revealing or admitting mistakes (pass around for 'comment')
 - lack of resources and facilities
- Difficult:
 - inspection is a 'precision instrument' – easily broken
- Disappointment and Frustration
 - with disappointing or *apparently* disappointing results and outcomes
- Benefits are intangible
 - needs analysis of results and outcomes to appreciate time and money saved

Should Fagan Inspections be made more widely known, acceptable and successfully used?

If so - How?

...these are not rhetorical questions either. What do you think?

How to make Fagan Inspections work - 1:

- Education and awareness
 - Aimed at all involved – originators, inspectors (incl. moderators) managers, CTOs, MDs, FDs... with attention paid to WIIFM – not just *how to*
 - Align with contemporary software *development* cultures (rename, use new terminology, patterns as descriptions... ‘badge engineering’?)

- Disseminate acceptable and appropriate methods for orgs. with non-engineering cultures to actively endorse, promulgate and support Fagan Inspections
 - needs to be managed and performed with respect and care
 - determine *when* as well as *how* to use
 - provide dev l/c context and inspection infrastructure
 - look to CMM ‘common features’ for *guidance* *

- Originators to ‘own’ inspections and their inspection data
 - they use them to improve their document quality
 - (defects found are confidential data owned by originators!?)

How to make Fagan Inspections work - 2:

- Redress balance of outputs in originators favour (and add value)
 - not just defects (i.e. 'mistakes') - formally recognize, value and measure design excellence, 'cool hacks', 'elegances', 'perfections' too – new 'cool hunter' role?

- Begin with 'agile inspections' as an introduction to real inspections
 - attractive and fashionable?
 - NB – complex and conflicts with standard advice – pilot the real standard process, then tailor when well understood

- Make the benefits tangible
 - Inspection data capture
 - Use this to provide savings predictions as part of project planning
 - Wider internal reporting and promotion

- ??

Finally:

- Can you afford not to review your early QC activities?
 - How effective is your current QC practice?
 - How much does this cost you?
 - Why?
 - (Two good metrics – cost per defect, % rework)
- What is possible in your organization?

References:

IBM TR 21.629: Low Level Design Inspection Specification, O. Robert Kohli, Ronald A. Radice, System Communications Division, Kingston N.Y. 12401

Radice 2002: High Quality Low Cost Software Inspections, by Ronald A. Radice, pub. Paradoxicon Publishing, ISBN 0-9645913-1-6

Grady 1997: Successful Software Process Improvement, by Robert B. Grady, pub. Prentice Hall PTR, ISBN 0-13-626623-1

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