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

Marilyn Bush, Chris Gerrard, Clifford Shelley
London SPIN, 25 March 2010

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
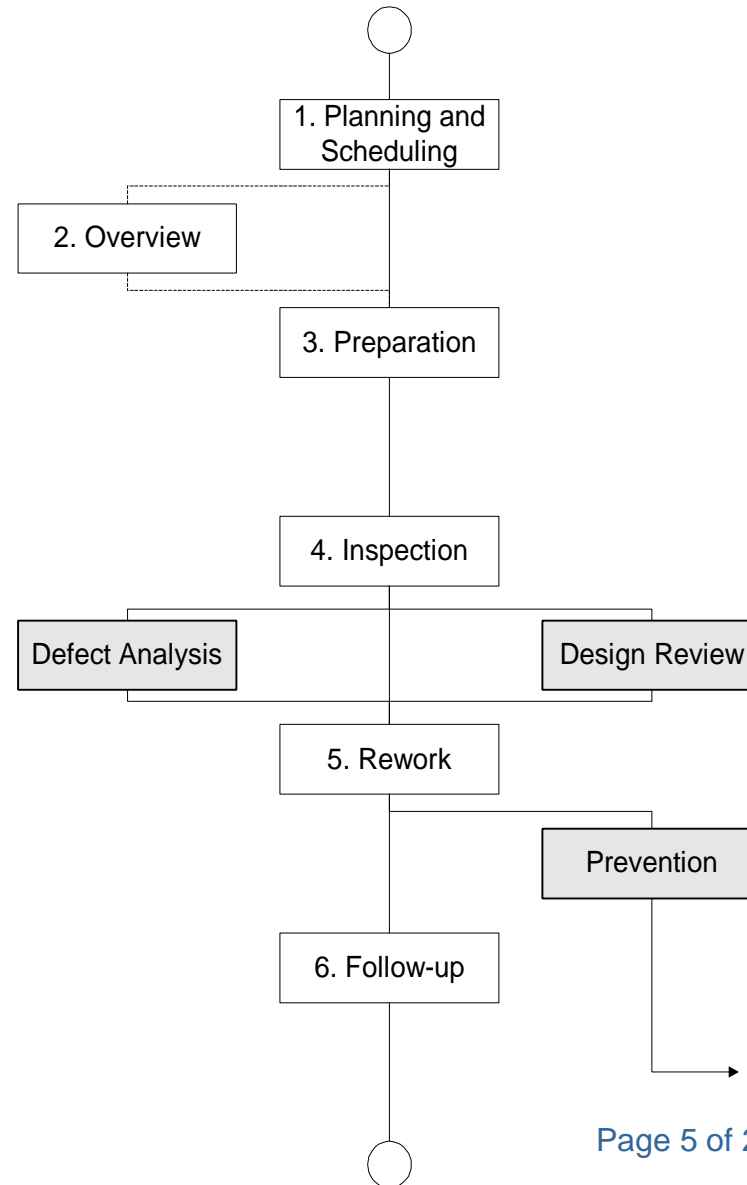
- One of the 'catalyst' processes…

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

○

```
         1. Planning and
           Scheduling

2. Overview

         3. Preparation

         4. Inspection

Defect Analysis        Design Review

         5. Rework

                    Prevention

         6. Follow-up
```

○

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 roles – 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 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 on this (but don't let anyone know)

- 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', 'profects' * 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

•??

* see www.osel.co.uk/papers/profects.pdf

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

Chris Gerrard

Aventex

Software Services Ltd

www.aventex.co.uk

chrisgerrard@aventex.co.uk

OXFORD
SOFTWARE ENGINEERING
LIMITED

9 Spinners Court, 53 West End,
Witney,
Oxfordshire
OX28 1NH

www.osel.co.uk
shelley@osel.netkonect.co.uk
Tel. +44 (0) 1993 700878

Marilyn Bush
Marilyn Bush Associates
m.w.bush@ieee.org
www.marilynbush.com