ROI: Defect Detection Experience in Software Development

Yogendra Pal, Australian Centre for Unisys Software (ACUS)
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Agenda

- **Introduction to ACUS**

- **Our product**

- **Definitions: Peer Reviews and Inspections**

- **Inspection Process**

- **Implementation at ACUS**

- **The Results**

- **ROI**

- **Consequences of Inspections**

Australian Centre for Unisys Software

- **Software research, development and support arm of Unisys globally for the Enterprise Application Environment, Agile Business Suite product range and Legacy Modernization Tools & Services.**

- **One of the largest Software R&D organisations in Australia**

- **ACUS employs around 200 software engineers mainly based in Australia, India and China**

- **The only R&D Engineering Laboratory of Unisys outside USA**

- **ISO 9001 – 2000 and SEI CMM Level 2 accredited organization. Currently working at SEI – CMMI Level 3**
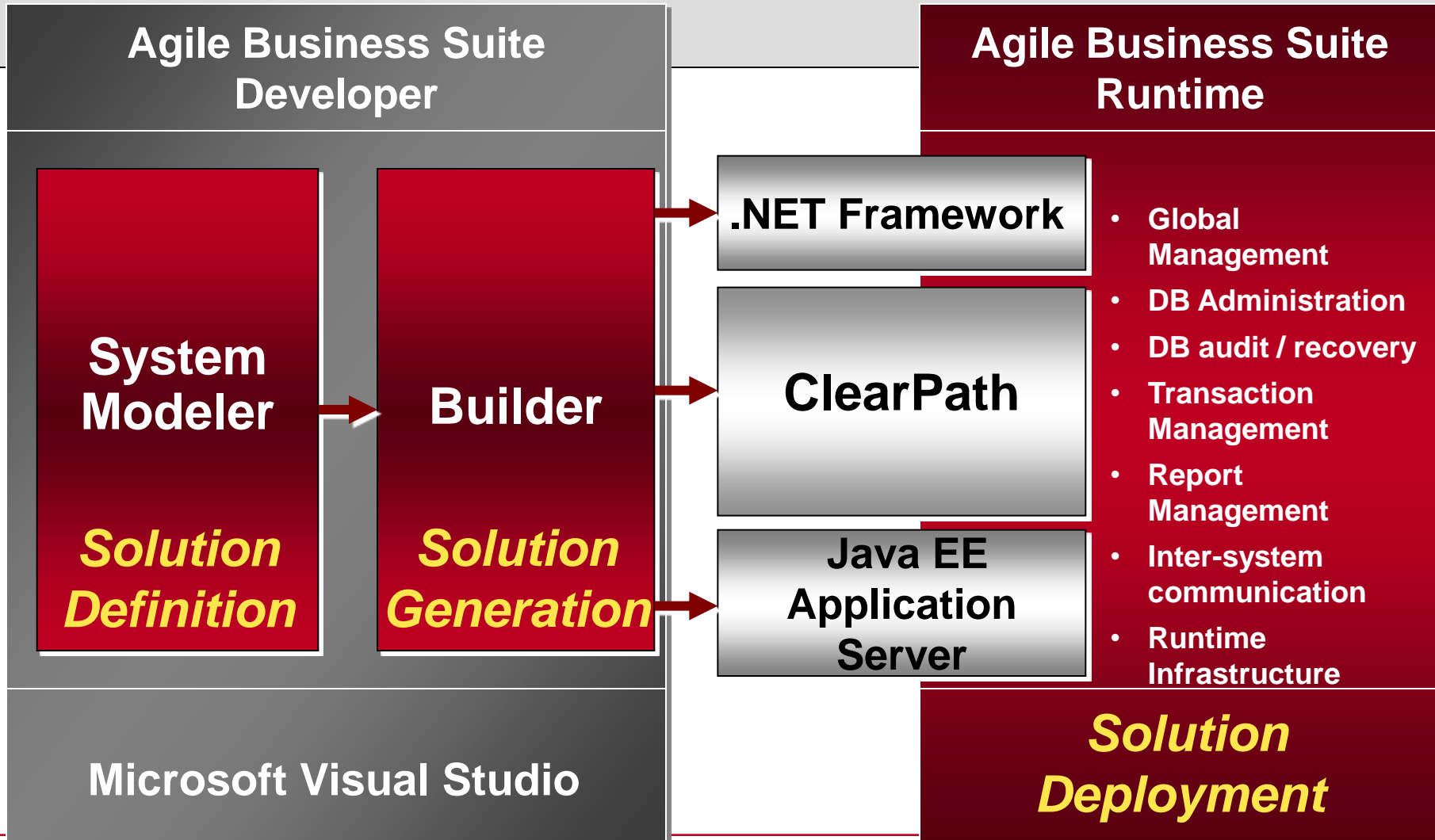
What is Agile Business Suite?

- 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…**
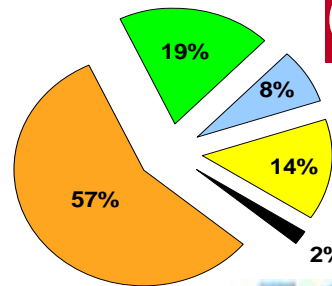
Agile Business Suite

Agile Business Suite Developer		Agile Business Suite Runtime
System Modeler *Solution Definition*	**Builder** *Solution Generation*	

.NET Framework

ClearPath

Java EE Application Server

- **Global Management**
- **DB Administration**
- **DB audit / recovery**
- **Transaction Management**
- **Report Management**
- **Inter-system communication**
- **Runtime Infrastructure**

Solution Deployment

Microsoft Visual Studio

World Class Customers

Commercial

Communications

Financial

Public Sector

Pie chart: 57%, 19%, 8%, 14%, 2%

The Inspection- FAGAN Defect Free Process

- It's a form of PEER Review as per CMMI Process Area: Verification
  - **Review Definition**: "A process or meeting during which a software product is presented to project personnel, management, users, user representatives, customers or other interested parties for comment or approval" {IEEE Std 1 028-1997}

- Michael Fagan's definitions:

Reviews improve/evolve /certify the work product of an operation

Inspections find and remove defects in the product, <u>and</u> reduce future defect injection through removing defects in the process.

Inspection Process

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

Planning — Materials meet entry criteria, schedule meeting

Overview — Educate team so they can prepare

Preparation — Prepare for role, record questions

Inspection Meeting — Find Defects

Identify Systemic Defects — **Process Improvement**

Fix all Defects, evaluate Investigate items — **Rework**

Verify all fixes & investigations are complete — **Follow-Up**

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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")

Defect Definitions

OPERATIONAL Defect

A condition that <u>could</u> cause operational failure or produce an unexpected result, if implemented as stated.

MINOR Defect

A condition of bad workmanship, violation of standards or incorrect spelling that will not lead to operational failure

INVESTIGATE Item

Further investigation needed to determine if this item is a defect

SYSTEMIC Defect

Work process that leads to or causes defects in the product

Practice at ACUS

- **Implemented for Requirements, Designs and Test Cases**

- **Code Inspections are underway, but data is not available**

- **24 inspectors are trained in the technique and process**

- **Training included most of the Engineering Managers and senior engineers**

- **Metrics are collected at the end of each Inspection**

- **Systemic Defects detected are handled by the SEPG/Engineering Managers**

- **All other defects are handled by the responsible engineer**

- **Team finds the practice very beneficial (once we got over the initial jitters) – excellent buy-in**

Inspection Results – Cost of Inspection

Man hours per inspection event cycle = 21	Number of Inspections (count)	Total Time for Inspection and forecast rework		
		Inspection (hours)	Rework (hours)	Total (hours)
Requirements	13	273	151	424
Design	16	336	128	464
Test	2	42	10	45
Totals	*31*	*651*	*289*	*940*

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Inspection Results- Total Defects Detected

OP defects detected per inspection = 16.7	Total Defects Detected			
	OPerational	Minor	INvestigate	Total
Requirements	255	166	32	456
Design	234	183	31	448
Test	30	30	8	68
Total	*519*	*379*	*71*	*972*

Inspection Costs – Resulting Savings

Ave cost of repair of OP defect = 24.7h	Cost if slipped to Release Testing (hrs)			
	OPerational	Minor	INvestigate	Total
Requirements	6299	16.6	790	7105.6
Design	5780	18.3	766	6564.3
Test	741	3	198	942
Total	*12819*	*37.9*	*1754*	*14611*

	Nett Savings (hrs)			
	OPerational	Minor	INvestigate	Total
Requirements	5785		366	6151
Design	5316		302	5618
Test	690		146	836
Total	*11791*		*814*	*12605*

Return on Investment

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

Months

■ Extension ■ Forecast Saving

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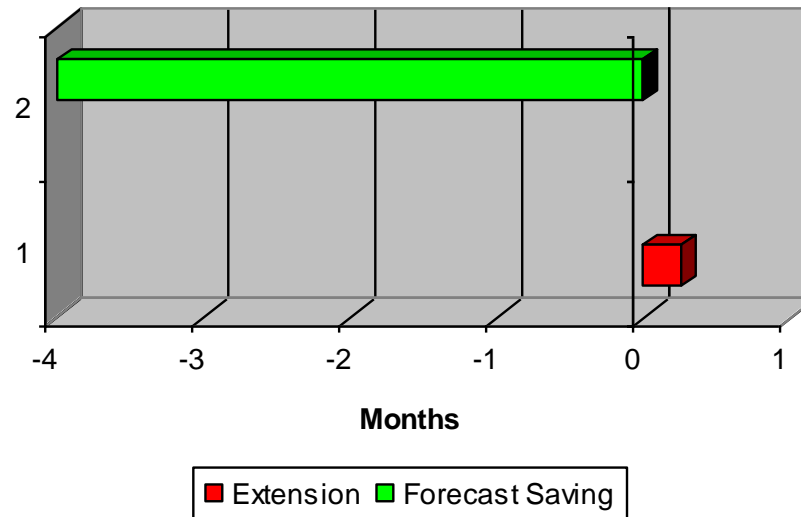
ROI: Dollars

Rates	
Defect detection rate	0.9 defects/hr
Projected Cost Saving	US$1.8m
Cost of Training	US$30k for course US$50k for attendee labour

$1,800

$80

Cost in US$,000

$1,800
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$0

1   2

■ Cost ■ Projected Saving
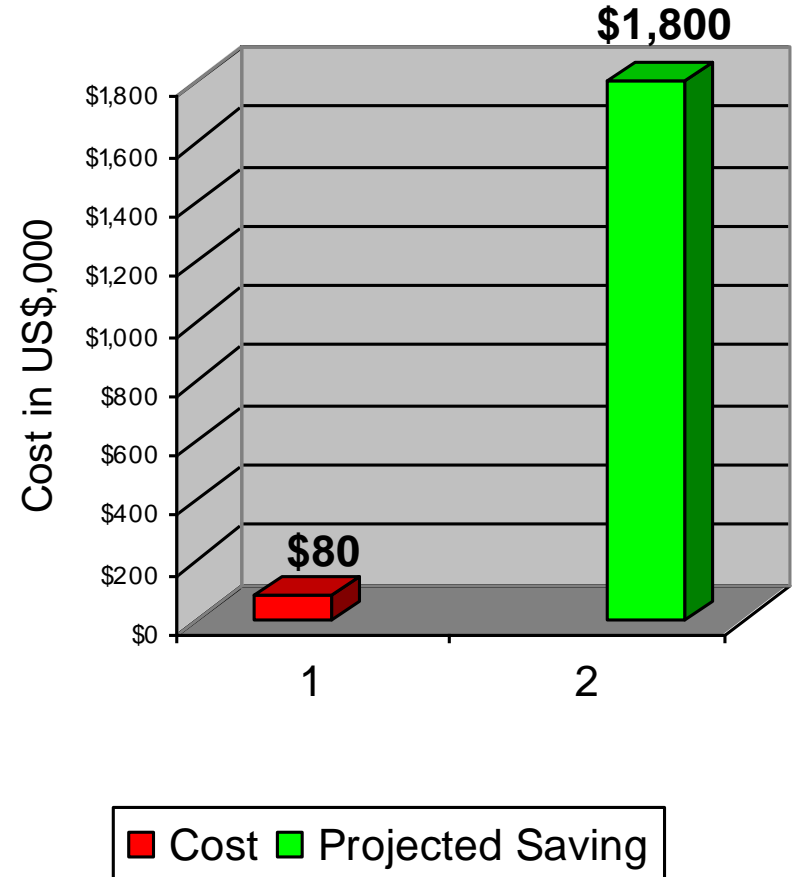
Consequences of Inspections

- **Product quality improvement**

- **Continuous process improvement for defect free development**

- **Defined entry and exit criteria for 'Peer Reviews'**

- **Knowledge sharing and enhancement – increases domain knowledge of the team**

- **Improvement in team synergy and morale**

- **Encourages good design and coding practice (Fear Factor)**

- **Schedule compression without cost**

- **Measurable and tangible improvements immediately (abundance of metrics)**