WEBINAR IV&V:
JAMINAN KUALITI SISTEM APLIKASI SEKTOR AWAM MELALUI PELAKSANAAN IV&V

EARLY TESTING & IMPORTANCE OF IV&V

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HEAD OF DEPARTMENT

INDEPENDENT VERIFICATION AND VALIDATION (IV&V)

AND CONSULTING SERVICES

Innovation for Life™

AGENDA

1. About MIMOS Technology Solution's IV&V lab
2. Software Project Challenges
3. Early Testing & Shift Left Testing
4. Early Testing Case Studies
5. Lesson Learnt & Recommendations
6. Importance of IV&V in Early Testing

INTRODUCTION IV&V's SOFTWARE TESTING LAB

> **Full spectrum of Software Testing**

Functional || **Static/Early** || **Performance**
Security || **Usability** || **Mobile** || **Data**

2007 - System Test Lab

2008 - Usability Lab

01

04

02

03

STANDARDS MALAYSIA ACCREDITED
SAMM 621

> 1st ISO/IEC 17025:2005 Software Testing Laboratory in Malaysia, since 2013
> 75% Certified professionals

> 200++ Platforms and Systems tested
> 70+ satisfied clients
> 30+ Local and International Trainings & Workshops conducted

> 20+ Testing Patents Filed Locally
> 80+ Published Papers in IEEE/SCOPUS Conferences
> 5+ In-House Published Testing Tools

ACCOLADES & ACCREDITATION

Objective of IV&V

To strengthen the software/system quality

Our Accredited Services includes:

- STATIC TEST — 01
- FUNCTIONAL TEST — 02
- PERFORMANCE TEST — 03
- SECURITY TEST — 04
- USABILITY TEST — 05
- DATA TEST — 06
- MOBILE TEST — 07
- SECURITY POSTURE ASSESSMENT — 08

STANDARDS MALAYSIA ACCREDITED — SAMM 621

First ISO/IEC 17025:2005 accredited Software Testing Laboratory in Malaysia, since 2013 under

"Skim Akreditasi Makmal Malaysia" (SAMM).

BUSINESS TODAY NEED TO ADDRESS

Complexity

New age competition

Digital Customers

Security Concerns

First time right

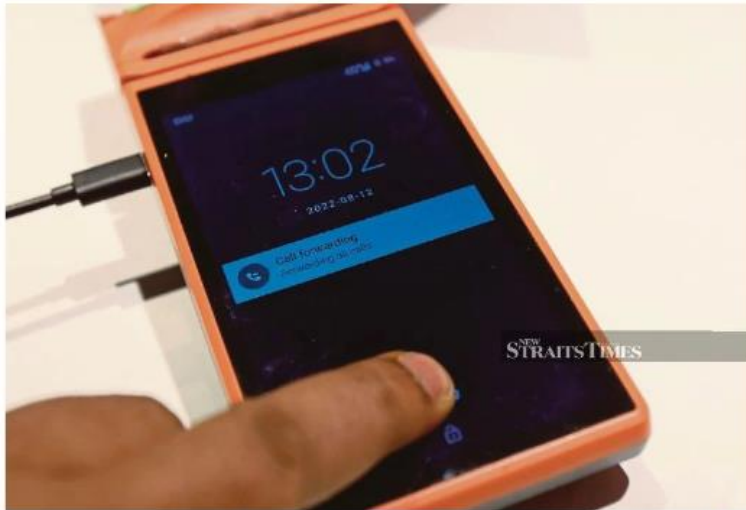Delays in time to market

Reduced Revenues

Increased Ops Cost

Dissatisfied customer

iPay88 breach only affected card data from online transactions

By New Straits Times - October 7, 2022 @ 4:13pm

Leading payment gateway provider iPay88 says the cybersecurity breach it experienced earlier this year only affected card data from online transactions. - NSTP file pic

KUALA LUMPUR: Leading payment gateway provider iPay88 says the cybersecurity breach it experienced earlier this year only affected card data from online transactions.

It said the cybersecurity breach resulted from a sophisticated intrusion by an unidentified party.

"The intrusion specifically targeted card data from online transactions. There was no impact on transactions made through the Android terminals, e-wallet QR payments, online banking, BNPL, vending machines, Point of Sale (POS) and batch card payment," it said in a statement here today.

It acknowledges that it bears the burden and responsibility of protecting card information.

| MORE NEWS

- Bank Negara orders iPay88 to beef up security
- Gerakan: Act fast to secure personal data of all Malaysians
- NST Leader: Data breach deja vu
- #TECH: The future of data management

"We respectfully apologise to the Malaysian public, our business partners, and merchants for this incident."

EPF fixes system glitch, urges i-Sinar applicants to recheck status

By ANGELIN YEOH

TECHNOLOGY

Monday, 08 Feb 2021
2:08 PM MYT

Some users affected by the technical error shared on EPF's Facebook page that their 'approved' status had changed to a message indicating that their application is still being processed. — Screengrab from Twitter

PETALING JAYA: The Employee Provident Fund (EPF) urged i-Sinar applicants to recheck the status of their applications from 8am today (Feb 8), as its system was glitched earlier.

According to an Astro Awani report, EPF released the statement a few hours after a lot of applications for i-Sinar Category 2 were approved on Sunday night.

EPF has apologised for the error through social media posts, saying it regretted any inconvenience caused.

Some users affected by the technical error shared on EPF's Facebook page that their "approved" status had changed to a message indicating that their application is still being processed.

POOR QUALITY CAN ERODE YOUR BUSINESS

SDLC VS IV&V ACTIVITIES

Requirement Analysis — QG1 — Requirement Design — QG2 — Development & Testing — QG3 — Acceptance Testing — QG4 — Maintenance

Testing Track
- Requirement Review
- Design Review
- Module Testing
- Functional Testing
- Usability Testing
- Data Testing
- Performance Testing
- SPA
- Patch Test

Quality Track

GO / NO GO
- Requirement Readiness Review
- ST / SIT Readiness Review
- UAT Readiness Review
- PAT / FAT/CoA Readiness Review
- Maintenance Review

EARLY TESTING GOALS

01 — Identify defects early during documentation, when they're easiest to fix

02 — Improves coverage & stability of requirement

03 — Reduce defects in production

04 — Anticipate and correct defects before they're coded

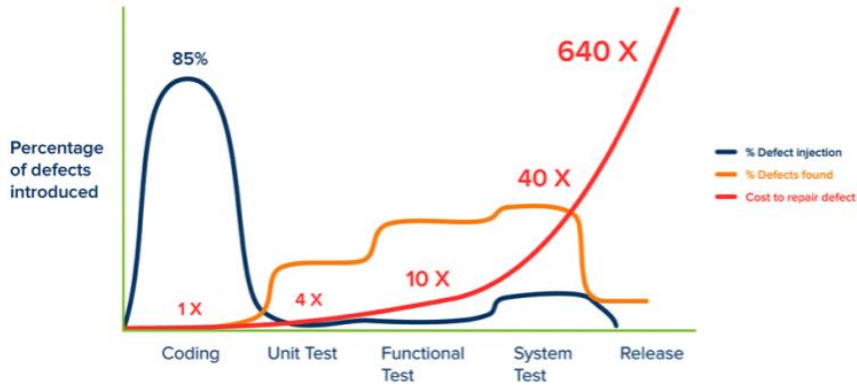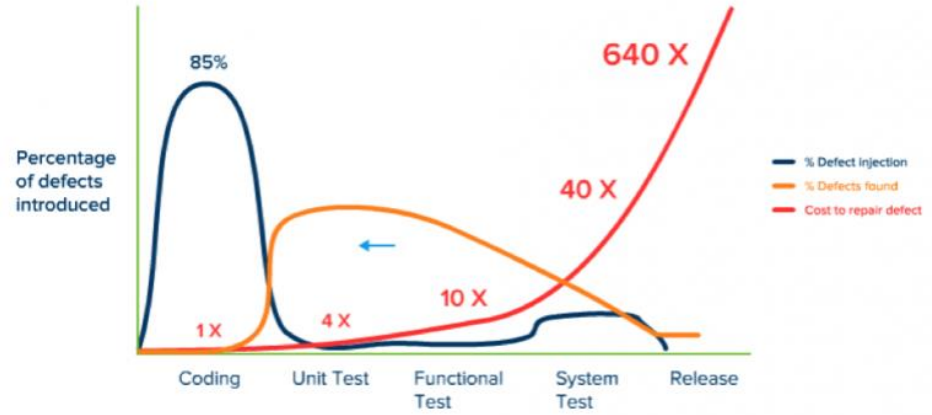**05** — Save both time and money

Possible with Early Requirement Inspection

Jones, Capers. Applied Software Measurement: Global Analysis of Productivity and Quality.

Jones, Capers. Applied Software Measurement: Global Analysis of Productivity and Quality.
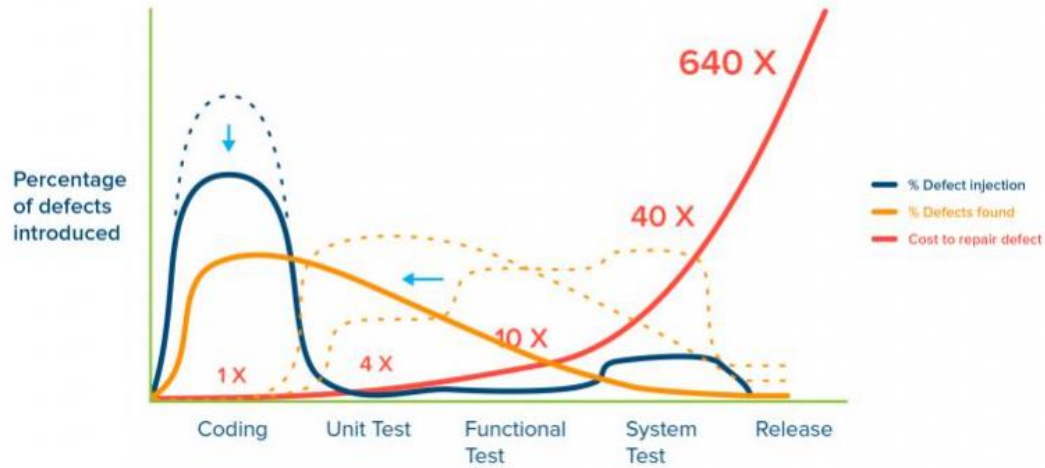
Jones, Capers. Applied Software Measurement: Global Analysis of Productivity and Quality.

Requirement is even earlier !

Early Testing Coverage

Business Requirement Specification	**User Requirement Specification**	**System Requirement Specification**	**Enterprise Architecture**
Traceability Matrix	**Database Design**	**Prototype**	**System Design/Architecture Documents**
	Test Plan	**Test Scripts**	

Better Documentation → Better Code → Fewer Defects → Faster Delivery → Higher Quality → Happier Customers

SHIFT LEFT APPROACH

Early Engagement

Requirement review criteria

Attend Requirement gathering sessions

Identify & clarify missing needs

Attend design reviews

Perform Static Test

EARLY TEST PROCESS FLOW

Refer to documents

1

Test engineers will refer to the requirement documents

Perform review

2

Review online and offline. Raise issues.

Share findings

3

Share the findings with development team

Fix findings

4

Development team will fix the issues and pass it over to IV&V team for validation

Open issues to be passed over to Development team for fixes

Validate fixes

5

Fixes will be validated by the IV&V team

Prepare report

6

Prepare the report of the test

Document sign-off

7

Once all the findings are closed, the document is ready for sign-off

ISO/IEC 29148 EARLY TESTING CRITERIAS

MISSING REQUIREMENTS	INCOMPLETE REQUIREMENTS	INCORRECT REQUIREMENTS	AMBIGUOUS REQUIREMENTS
Requirements are missed or not documented during requirement phase.	Requirements are lacking of additional inputs and information – e.g. measurement units not mentioned.	Wrong or inaccurate requirements.	Requirement is not clear and contain open ended term. For example: ambiguous use of words – e.g. like, such as, may be, could be.
UNVERIFIABLE REQUIREMENTS	INCONSISTENT REQUIREMENTS	UNNECESSARY REQUIREMENTS	NOT IMPLEMENTATION FREE
Requirement cannot be tested by inspection, analysis or demonstration.	conflict with other requirement , use different terminology through the requirements or create redundancy with other requirement.	Requirement is unnecessary if none of stakeholder needs the requirement or removing the requirement will not effect the system.	Requirements contain unnecessary design and implementation information.

ISO/IEC 29148 EARLY TESTING CRITERIAS

UNTRACEABLE REQUIREMENTS	INFEASIBLE REQUIREMENTS	INTERFACE ERRORS	DOCUMENTATION ERRORS
Requirement not traceable with other specific documented stakeholder statement(s) of need requirement or other source such as specification ,design and testing documents. Requirement also not having unique identity or number and can be separated or broken into smaller.	*Requirement is technically not achievable, require major technology advances, and not fits within system constraints (e.g., cost, schedule, technical, legal, regulatory) with acceptable risk.*	*Requirement are having incorrect or missing interface information.*	*Wrong or incorrect information/version or spelling mistake or leaving out a word or sentence sturcture or document formatting (alignment, numbering, etc).*

EARLY TESTING CASE STUDIES

Project ID	No. of Modules	IV&V Testers	Total Defects	Average Cycle	Average Defects	
					Per module	Per tester
1	8	3	153	3	19	51
2	13	4	383	3	29	96
3	17	4	1510	5	89	378
4	8	5	104	3	13	21
5	15	5	283	3	19	57
6	15	6	1819	6	121	303

Project ID	COMPLEXITY	CITIZEN CENTRIC
1	MEDIUM	YES
2	MEDIUM	YES
3	HIGH	YES
4	MEDIUM	NO
5	HIGH	YES
6	HIGH	YES

Project Background
1. Government projects
2. Different complexities
3. Different System Developers

EARLY TESTING CASE STUDIES

No.	Defect Category	Project ID 3		Project ID 4	Project ID 5		Project ID 6	TOTAL
		URS	SRS	URS & SRS	URS	SRS	BRS	
1	Missing Requirements	38	684	17	34	22	146	941
2	Incomplete Requirements	10	41	14	23	10	375	473
3	Incorrect Requirements	4	65	21	22	12	224	348
4	Ambiguous Requirements	12	106	1			187	306
5	Unverifiable Requirements		14	4	4	1	41	64
6	Inconsistent Requirements	7	28	13	53	11	556	668
7	Untraceable Requirements	1	1	9	2	3	44	60
8	Infeasible Requirements			8			1	9
9	Unnecessary Requirements						5	5
10	Not Implementation Free							0
11	Interface Errors		12					12
12	Documentation Errors	149	338	17	67	19	240	830
	TOTAL	221	1289	104	205	78	1819	3716

Documentation error is common Top 3 error in all case studies.

Top 3 of overall defect category (minus Documentation error)

1. Missing Requirement
2. Inconsistent Requirement
3. Incomplete Requirement

Distribution of Defect Category by Project ID

KEY LESSON LEARNT & RECOMMENDATIONS
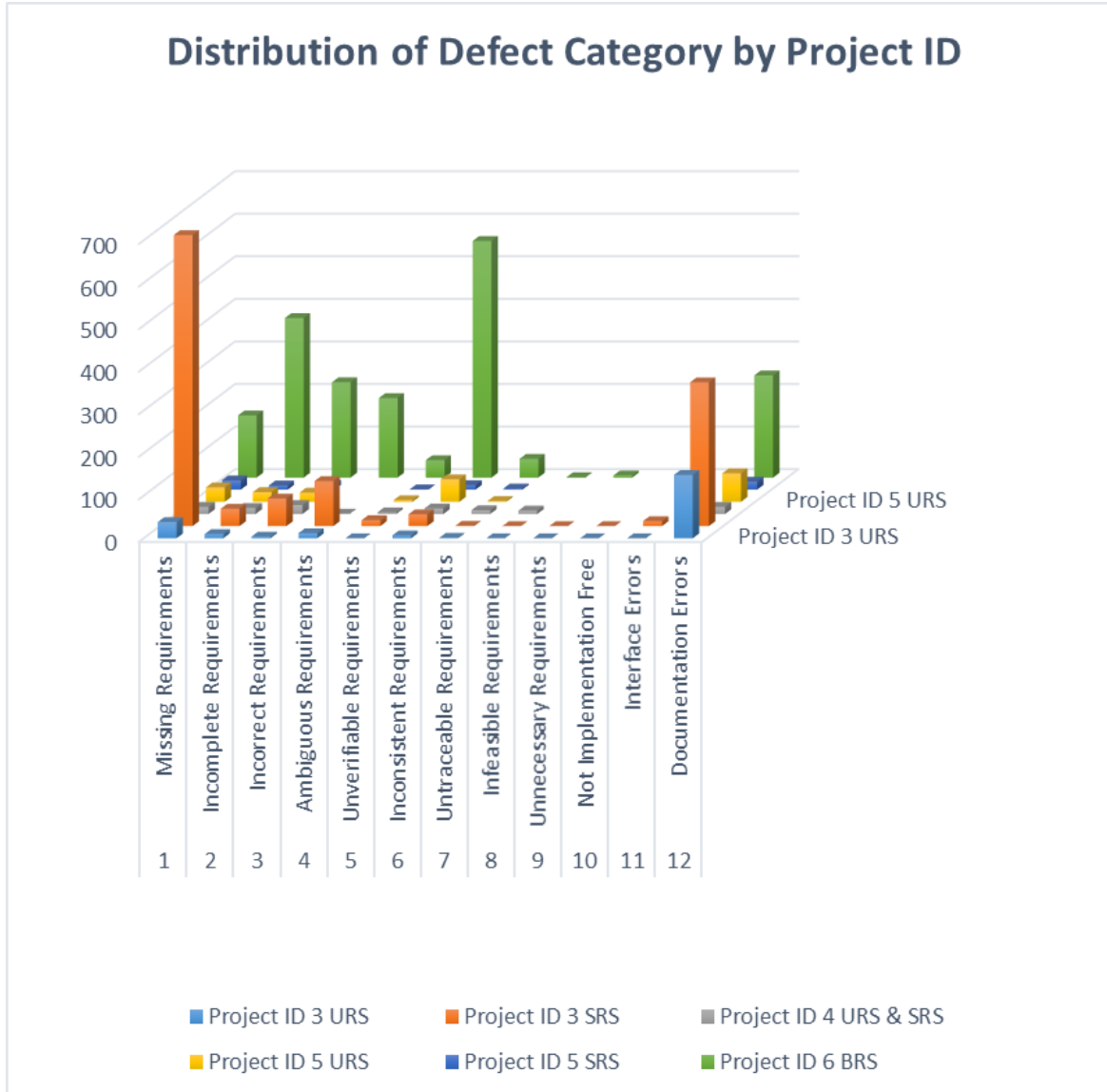
1. IV&V's involvement shall start early during requirement gathering workshop
   - Project ID 1,2,4 & 5 – IV&V's involvement was after URS/BRS was completed
   - Fewer overall defects raised by testers as entirely based on documentations Observations:
   - Defect fix cycle averaging at 3 cycles per module

2. Poor documentation quality, SAs & BAs technical writing skills require upskilling. Talent retention is important.
   - Documentation error is the highest
   - Knowledge in requirement engineering is essential

3. Static test performed only after users have reviewed & acknowledged the requirement before 3rd party verification
   - Project ID 6 : Un-finalized BRS was submitted to IV&V for static testing
   - More than 50% of BRS were completely revamped
   - Average defect closure cycle increased from 3 to 6 cycle/module
   - Delay in project timeline & waste of effort as the requirement gathering was process repeated

IMPORTANCE OF IV&V EARLY TESTING

1. Defects are identified early at documentation level

2. Defects are corrected to meet Functional and Non-Functional Requirements

3. Non-functional i.e Performance & Security requirements are common missing requirement category

4. Minimizes documentation error slips into coding

5. Improves requirement coverage

   Example: newer system incorporating legacy system features, functionality and Data Migration requirements.

6. Verify traceability between BRS –URS- SRS

7. Saves both time & money

THANK YOU