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

INDEPENDENT VERIFICATION & VALIDATION (IV&V) IN V-MODEL THE IMPLEMENTATION'S EXPECTATIONS

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with Focus Areas in:
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- ✓ Professional **Services**
- ✓ IoT & Software **Engineering** Solutioning
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TMMi CERTIFIED LEVEL 5

Our Offering in Six (6) Key Areas (non-Academy):

1 SOFTWARE ENGINEERING SERVICES
- ➢ **Functional Size Estimation** (using IFPUG method)
- ➢ Requirement **Elicitation & Modelling** (using C-BMPN)

2 SOFTWARE DEVELOPMENT
- ➢ **Web Portal** (.Net, Open source, Cloud)
- ➢ **Mobile Apps** (Android, iOS)
- ➢ **Online Payment** (Debit, Credit, e-Wallet, Terminal, Kiosk)
- ➢ **Internet of Things** (IoT)

3 SOFTWARE TESTING
- ➢ **Static Test** (Requirement Spec., Design Spec., Project Mgmt. Documents)
- ➢ **Functional Test** (Manual/Auto/Risk-based, Exploratory)
- ➢ **Performance Test** (Response, Load, Stress)
- ➢ **Security Test** (Vulnerability Assessment, PenTest, Database, Network devices, Infra., Ports, Fuzzy)

4 CONSULTANCY SERVICES
- ➢ **Test Management Office** - TMO
- ➢ **Verification & Validation** - V&V or Independent V&V
- ➢ **Testing Center of Excellence** - TCoE (SQA Framework)
- ➢ **Test Maturity Model Integration (TMMi)** - (Accreditation Readiness & Professional Assessment)

5 POST GO-LIVE TESTING
- ➢ **Functional Test** (Regression Test)
- ➢ **Performance Test** (Response, Load, Stress)
- ➢ **Security Test** (Vulnerability Assessment, PenTest, Database, Network devices, Infra., Ports, Fuzzy)
- ➢ **Functional Size Estimation** (For New or Change Request)

6 CUSTOMS SERVICES
- ➢ **Special Project(s)** (Electric Vehicle (EV) Charging System – mobile, apps, kiosk)
- ➢ **Specialized Training(s)** (Tools/Template Workshop/OJT)

SOFTWARE ENGINEERING ICON

1. **INTRODUCTION**
   - ABOUT CUSTOMMEDIA SDN. BHD.

2. **THE ADVANCED V-MODEL**

3. **IV&V EXPECTATIONS**
   - PRE-TENDER STAGE
   - DURING SYSTEM DEVELOPMENT STAGE
   - POST GO-LIVE STAGE

4. **Q & A**

- The **V-model** is a software development process which can be presumed to be the **extension of the waterfall model**.
  - ❑ It was the first proposed by Paul Rook in the late 1980s.
  - ❑ Instead of moving down in a linear way, the process steps are bent upwards after the coding phase, to form the typical V shape.
- The **V-Model** demonstrates **relationships between each phase of the development life cycle and its associated phase of testing**.

- ➢ Software development involve large investment, where **requirement specification, design, functionality, performance, security, critical and sensitive data** are of the government's concerned.

- ➢ During **development and maintenance** of such long lived software, requirements are analyzed, designed and code modules are developed, testing is planned and code is tested many times, **by the appointed software vendor(s)**. Hence, software quality is like software vendor(s)' responsibilities.
  - ▪ Often, Project's timeline/contract is tight. Resulting **less** (if not questionable) **effort for testing during development and post Go-Live**.
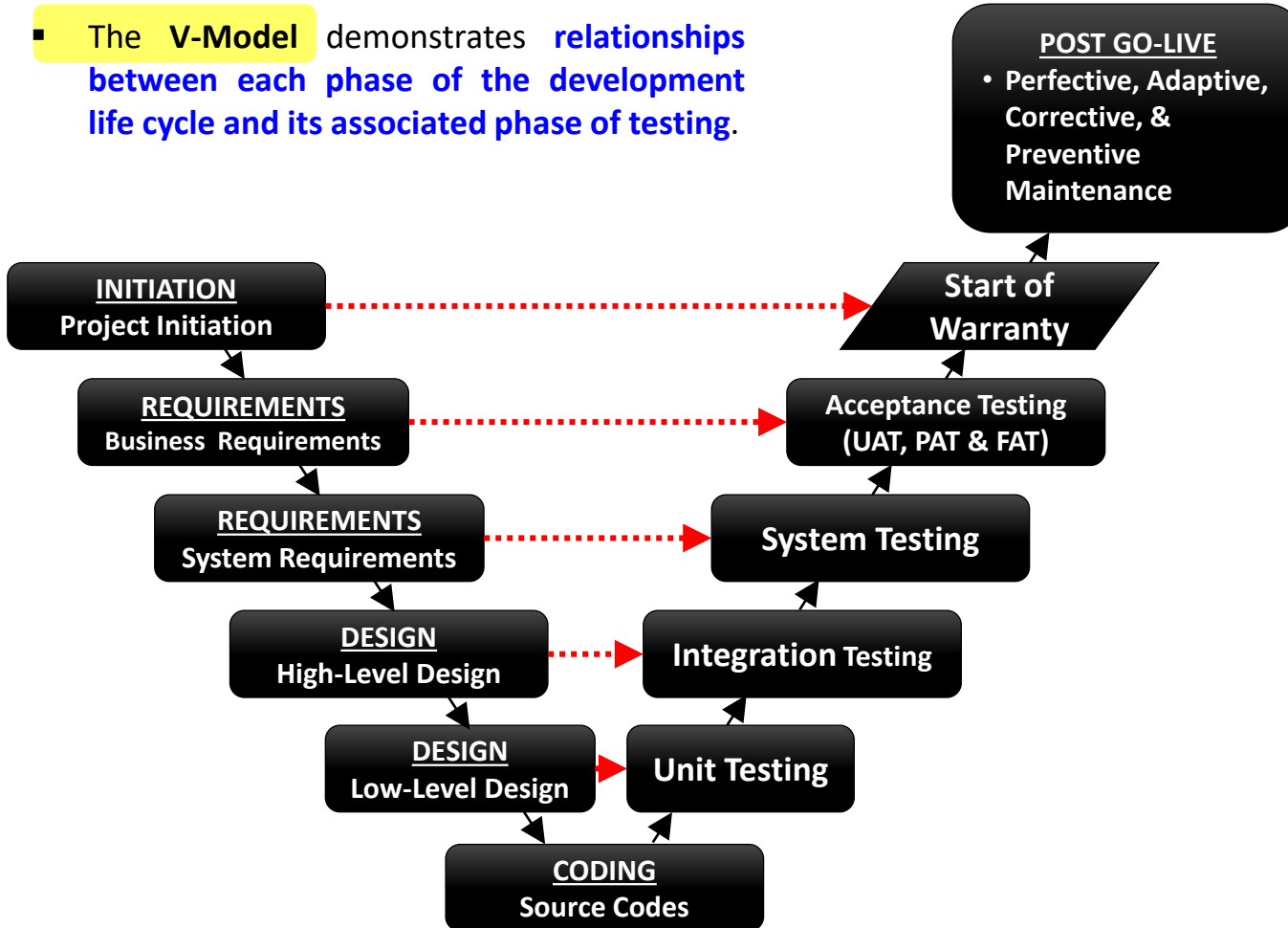
- ➢ **Software testing** directly links to quality of product.
  - ➢ **Specialized, trained and certified testers** are required to perform software testing in critical areas or Project's **requirement, functionality, performance & security**.
  - ➢ Software testing is described as a **continuous improvement process** that must be integrated into an software maintenance methodology.

- ➢ **Software Maintenance**'s definition:
  - ❑ "**Totality of activities required to provide support to a software system** (*ISO/IEC/IEEE 14764:2021, Software engineering -- Software life cycle processes -- Maintenance, 3.1.12*)
  - ❑ "**The modification of a software product after delivery to correct faults, to improve performance or other attributes, or to adapt the product to a modified environment**.", IEEE Standard for Software Maintenance, 1993; *ISO/IEC/IEEE 14764:2006*)

POST GO-LIVE
- Perfective, Adaptive, Corrective, & Preventive Maintenance

INITIATION
Project Initiation

REQUIREMENTS
Business Requirements

REQUIREMENTS
System Requirements

DESIGN
High-Level Design

DESIGN
Low-Level Design

CODING
Source Codes

Start of Warranty

Acceptance Testing
(UAT, PAT & FAT)

System Testing

Integration Testing

Unit Testing

CONTENTS

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4. **Q & A**

1. IV&V Contract Management is finalized:

   i. Independent from System Developer

      a) **Managerial** – 2 tenders (issued by an agency) ie <u>NOT</u> under the System Developer. Report direct to agency <u>NOT</u> System Developer.

      b) **Technical** – Dedicated Test Environment for testing; own test tools.

      c) **Financial** – Direct invoice to agency; independent of System Developer's progress.

   ii. Timing

      ➢ Parallel – from Initiation to at least 6 months after Go-Live

      ➢ Delayed – eg near completion or Requirement stage to 6m after Go-Live

   iii. Software Size

      ➢ What is the estimated functional size – using **Function Point Count (FPC)**

   iv. Contract Value

      ➢ Using **FPC as the basis** eg RM500 per fp. – not percentage of System Developer's contract value, eg 5% .

2. Engagement Model is finalized:

   i. Engagement Model – as per IV&V Handbook

      a) **Standard** – common and easy to implement

      b) Collaborative – unless agency provide clear TOR

      c) Integrated – clear TOR needed, as if having PMC

   ii. Test Management Office (TMO)

      ➢ Specify the TMO team – eg senior Test Manager and admin

      ➢ Subject Matter Expert (SME) – eg Function Point Count (FPC)

   iii. Specialized Testing Teams

      ➢ Specify the **specialized teams** – eg Early Testing, Functional, Performance, Security, Mobile Apps, Data Migration, and Provisioning/Infra team

   iv. Quality Gate Keeper

      ➢ Who is agency's QGK? – Project Director, PMO Head?

3. Software requirement is finalized:

   i. Requirement

      ➢ **Phases** – What is development strategy? Single-phase, 2-phase, 3-phase?

      ➢ **Coverage** -- How many functional modules/SRS documents in each phase(s)?

      ➢ **Iteration** – How many test iterations needed?

   ii. Functional

      ➢ **Functional Modules** – the Project's scope

      ➢ **Actors** – who is doing what

      ➢ **Business Processes** – As-Is and To-Be workflow

      ➢ **Constraints** – known rules/guidelines/SOP

   iii. Performance

      ➢ **Response Time** – how fast (in second)?

      ➢ **Load** – users at Low (Min), Typical (Normal) & Peak (Max) conditions. Users load in seconds. Not in day, month or years!

   iv. Security

      ➢ **VA** – using OWASP Top 10 2021?

      ➢ **PenTest** – where are the DC & DRC locations?

      ➢ **Database Test** – what databases?
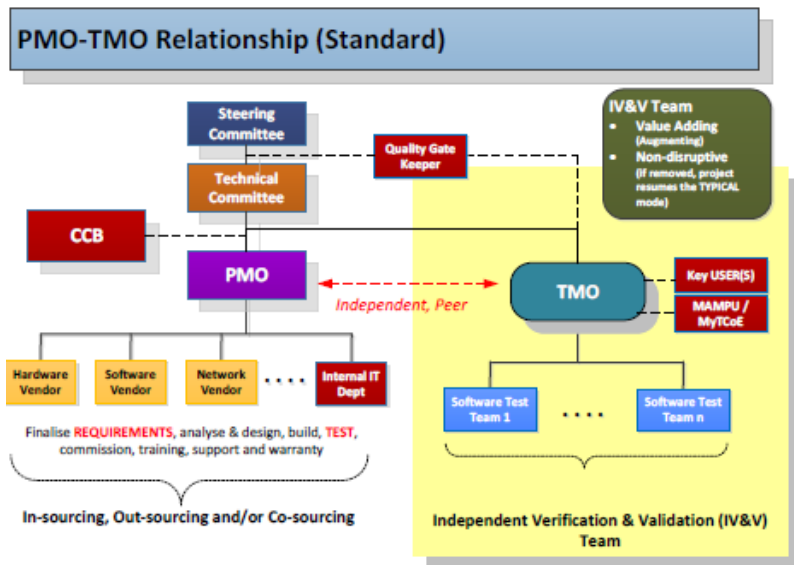
   v. Mobile Apps

      ➢ **VA** – using OWASP Mobile Top 10 2016?

      ➢ **Technology** – Android, IoS, Harmony?

   vi. Data Migration

      i. **To-Be database** – what technology

   ii. **Timing** – when DM is required? eg for UAT & PAT

Refer: IV&V Handbook – Section 4.3 PMO-TMO Relationship Models

- IV&V Service Provider provides value-added services **augmenting** the agency's PMO capabilities where needed.
- **Non-disruptive** style.
- The PMO and TMO are **peer, independent entities working and co-existing together** to deliver high-quality ICT project deliverables.
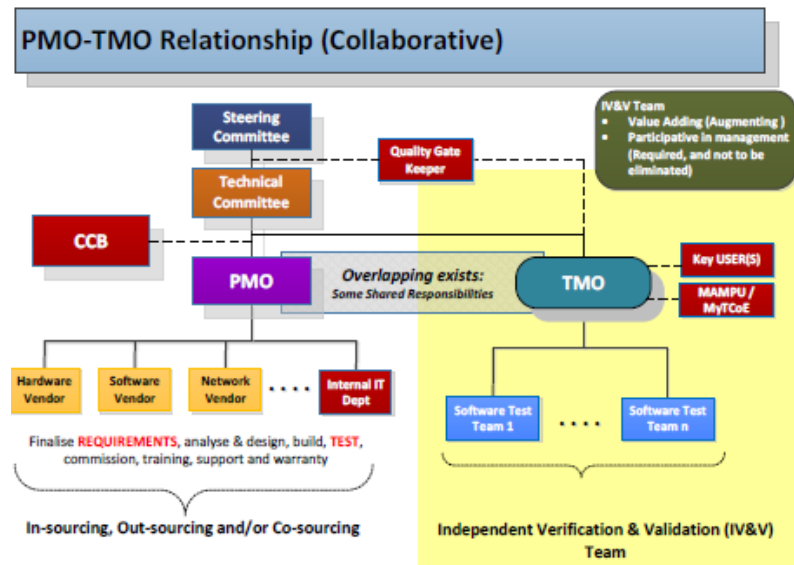
- TMO will **fill in the gaps** in PMO capabilities.
- Quality assurance initiatives and tasks are performed by TMO to prevent defects in ICT products,
- TMO will analyze to recommend "problem avoidance" strategies before delivering solutions or services in production, including enforcing a focus on quality earlier in the process.
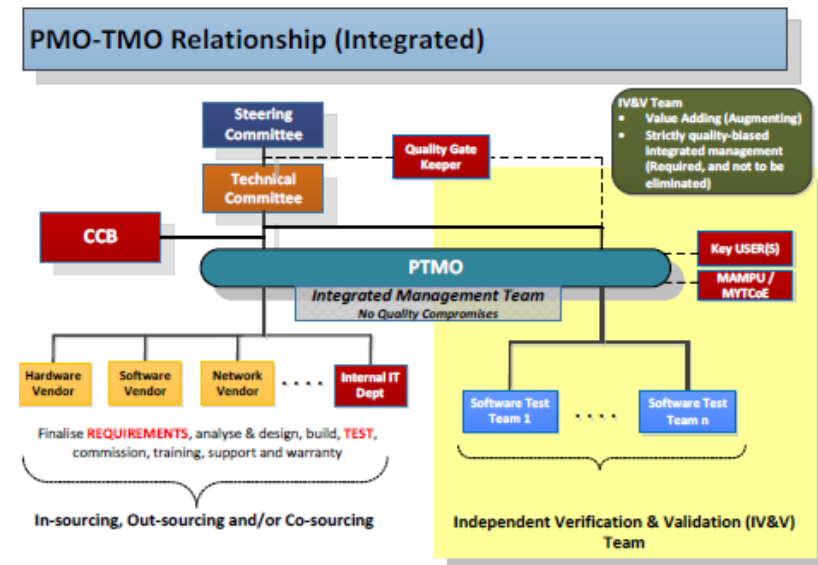
- The most advanced level of the three (3) PMO-TMO relationship models.
- A new "**merged**" entity between agency's PMO and TMO is created called the **Project Test Management Office (PTMO)** that is independent of the operations, software Development Team i.e. software vendor, and other vendors etc.
- TMO heavily driving PTMO activities, infusing quality into the process lifecycle.
- Given the goal that '**quality is everything**', the PTMO ensures and enforces the agency's teams and their Development Teams to deliver quality deliverables.
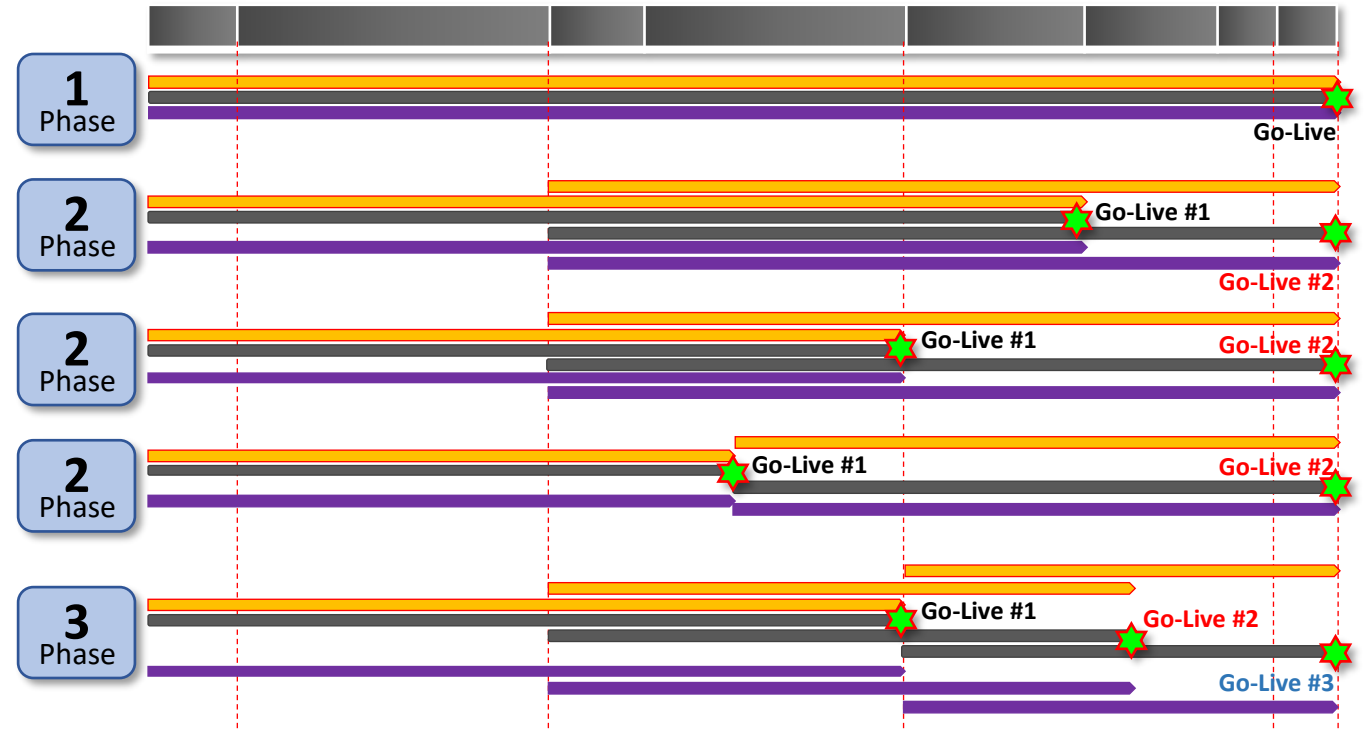
System Developer

Initiation	Requirement	Design	Coding	SIT	UAT	PAT	FAT

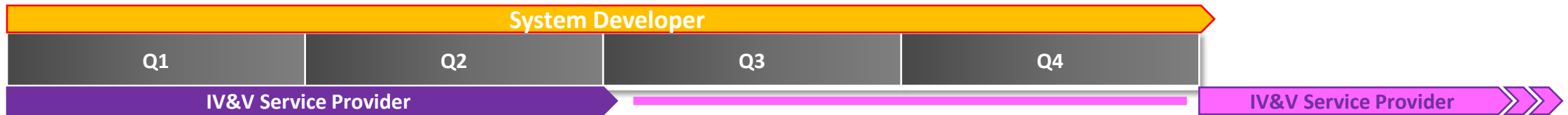**IV&V Service Provider**

QG 1 **QG 2** **QG 3** **QG 4**

1. **Timing:**
   i. **When the IV&V will commence** the Project?
2. **Quality Gate (QG):**
   i. QG1 at the end of Requirement stage
   ii. QG2 at the end of Design stage
   iii. QG3 at the end of SIT stage
   iv. QG4 at the end of UAT stage (NOT PAT or FAT)
   v. How many quality gates per phase?
3. **Test Iteration:**
   i. How many test iteration per phase?
4. **Augmented testing:**
   i. What augmented testing is needed from an IV&V?
   ii. Augmented testing by IV&V:
      a) Early Testing or Static Test on Req docs (SRS)
      b) Early Testing or Static Test on Design docs (SDS)
      c) Automated Functional Test @UAT
      d) Automated Performance-Load-Stress Test @UAT
      e) Automated VA & PenTest @UAT
5. **Review System Developer's Deliverables:**
   i. For Sw Development -- SRS, SDS, Readiness to Go-Live
   ii. For Test Design – Test Design Spec, Test Case Spec & Test Procedure Spec.
   iii. For Test Reports - Unit Test, Integration Test, System Test, Functional Test, Mobile Apps Test, Installation Test, Data Migration Test, Pilot Test.
   iv. For Project Management – Plan docs, Gantt Chart, Progress Rpts (Weekly, Monthly), Chg Request (CR).
   v. For Defect Management – Defect status.

6. **Go-Live Strategy:**
   1. Phase – How many system dev phase(s)?
   2. Go-Live – How many Go-Live?
   3. QG – How many Quality Gates?
   4. IV&V – Complicated?

1 Phase — Go-Live

2 Phase — Go-Live #1, Go-Live #2

2 Phase — Go-Live #1, Go-Live #2

2 Phase — Go-Live #1, Go-Live #2

3 Phase — Go-Live #1, Go-Live #2, Go-Live #3

IV&V EXPECTATIONS :: POST GO-LIVE STAGE

System Developer			
Q1	Q2	Q3	Q4

IV&V Service Provider

IV&V Service Provider

1. **Duration:**
   i. **How many months the IV&V is required during Warranty period**? – 6 months
      as per IV&V Handbook or the Warranty period?

2. **Test Types:**
   i. What Test Types needed from IV&V?
   ii. Augmented testing by IV&V:
      a) Automated Performance-Load-Stress Test
      b) Automated VA & PenTest

3. **Review System Developer's Deliverables**:
   i. For Perfective, Adaptive, Corrective, & Preventive Maintenance
      a) What test Reports?
      b) How many test iterations?
   ii. For Defect Management – Defect status
   iii. For Chg Request (CR) – Functional Size, CR

4. IV&V Services for **Post-Warranty**:
   i. Scheduled automated Performance and Security testing.
   ii. Which budget – OPEX?

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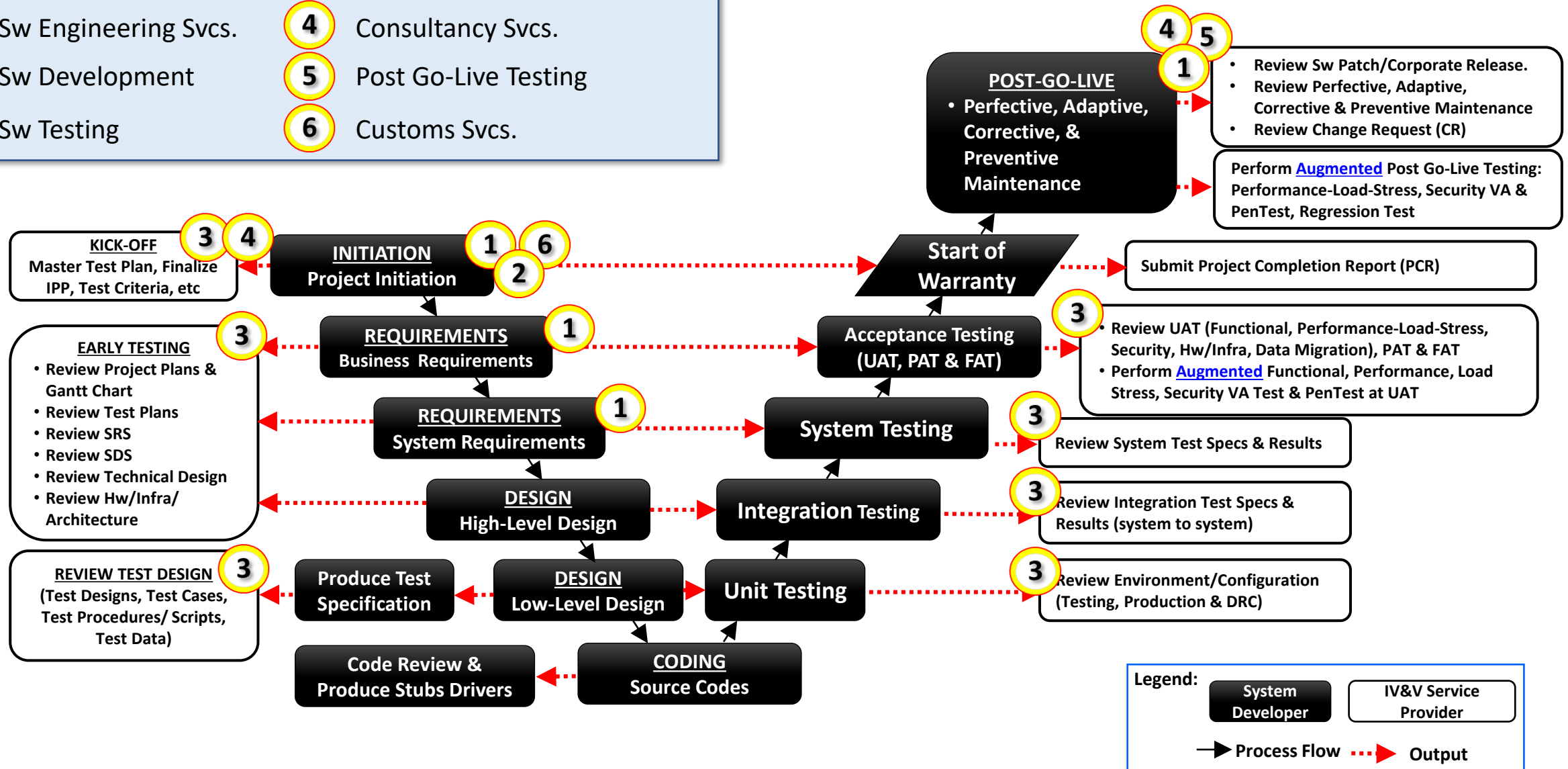
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4. **Q & A**

A SNAPSHOT OF CUSTOMMEDIA'S OFFERING FOR IV&V SERVICES

Our Offering:

1 Sw Engineering Svcs.

2 Sw Development

3 Sw Testing

4 Consultancy Svcs.

5 Post Go-Live Testing

6 Customs Svcs.

4 5 1
- Review Sw Patch/Corporate Release.
- Review Perfective, Adaptive, Corrective & Preventive Maintenance
- Review Change Request (CR)

Perform **Augmented** Post Go-Live Testing: Performance-Load-Stress, Security VA & PenTest, Regression Test

POST-GO-LIVE
- Perfective, Adaptive, Corrective, & Preventive Maintenance

3 4 **KICK-OFF**
Master Test Plan, Finalize IPP, Test Criteria, etc

1 6 2 **INITIATION**
Project Initiation

Start of Warranty

Submit Project Completion Report (PCR)

3
- Review UAT (Functional, Performance-Load-Stress, Security, Hw/Infra, Data Migration), PAT & FAT
- Perform **Augmented** Functional, Performance, Load Stress, Security VA Test & PenTest at UAT

3 **EARLY TESTING**
- Review Project Plans & Gantt Chart
- Review Test Plans
- Review SRS
- Review SDS
- Review Technical Design
- Review Hw/Infra/ Architecture

1 **REQUIREMENTS**
Business Requirements

Acceptance Testing (UAT, PAT & FAT)

1 **REQUIREMENTS**
System Requirements

System Testing

3 Review System Test Specs & Results

DESIGN
High-Level Design

Integration Testing

3 Review Integration Test Specs & Results (system to system)

3 **REVIEW TEST DESIGN**
(Test Designs, Test Cases, Test Procedures/ Scripts, Test Data)

Produce Test Specification

DESIGN
Low-Level Design

Unit Testing

3 Review Environment/Configuration (Testing, Production & DRC)

Code Review & Produce Stubs Drivers

CODING
Source Codes

Legend:

System Developer	IV&V Service Provider

→ Process Flow   ⇢ Output

THANK YOU

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