Quality Process Awareness
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Document History

Date	Course Version No.	Software Version No.	Developer / SME	Change Record Remarks

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Course Goals and Non Goals

- **Course Goals**
  - To provide an overview of quality processes practiced at iGATE
  - To orient the QMS support for Software engineering practices at IGATE

- **Course Non Goals**
  - This does not intend to provide a complete know-how of roles & responsibilities for different role holders such as Requirement Engineers, Configuration Managers , Defect Prevention Champions etc

Pre-requisites

- **The participants should have attended the Introduction to Software Engineering session .**

Intended Audience

- New entrants to the organization (Fresher's batches)

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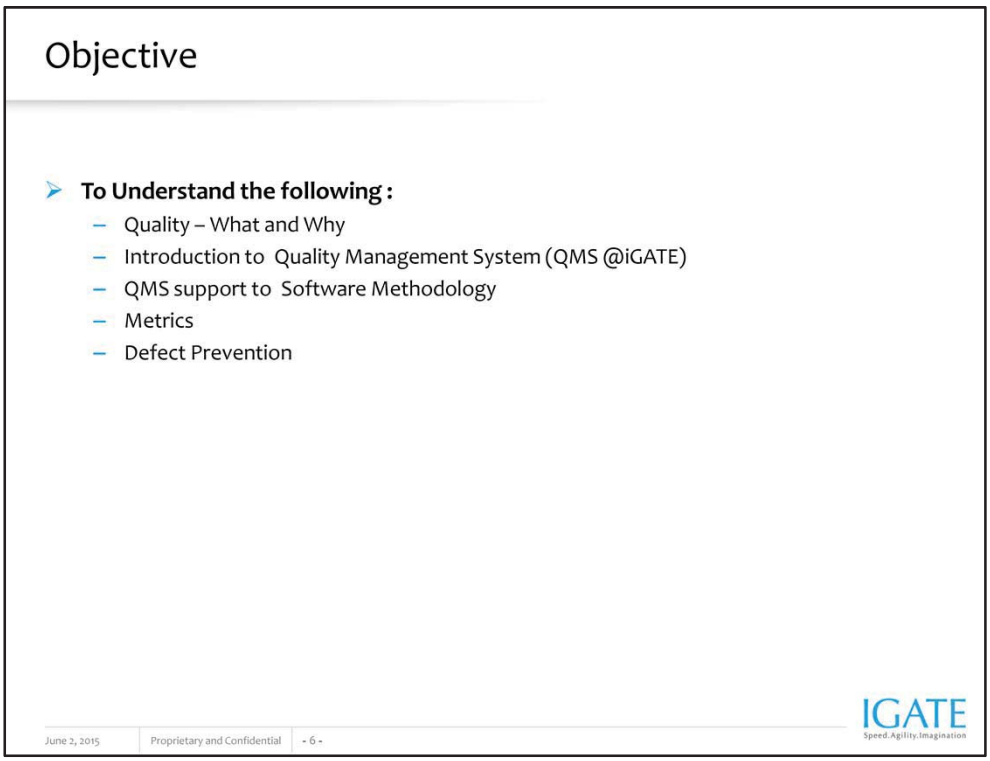
Objective
To Understand the following :
Quality – What and Why
Introduction to Quality Management System (QMS @iGATE)
QMS support to Software Methodology
Metrics
Defect Prevention
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Quality Management System
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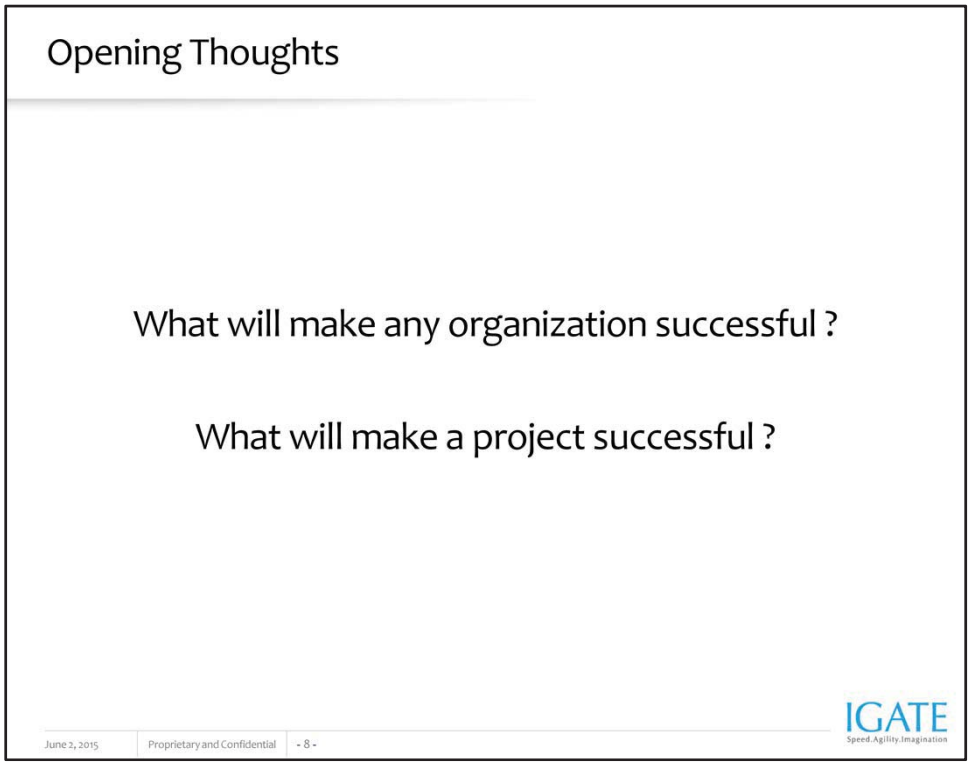

For any organization to be successful they need to have a strong client base and innovative ideas

For clients to keep coming back or getting newer ones we need to meet their requirements in most optimal way

Concept of Quality

- **" I don't know much about Quality, but I am sure of one thing – if your quality is good, customers come back, else product come back."**

  - Margaret Thatcher

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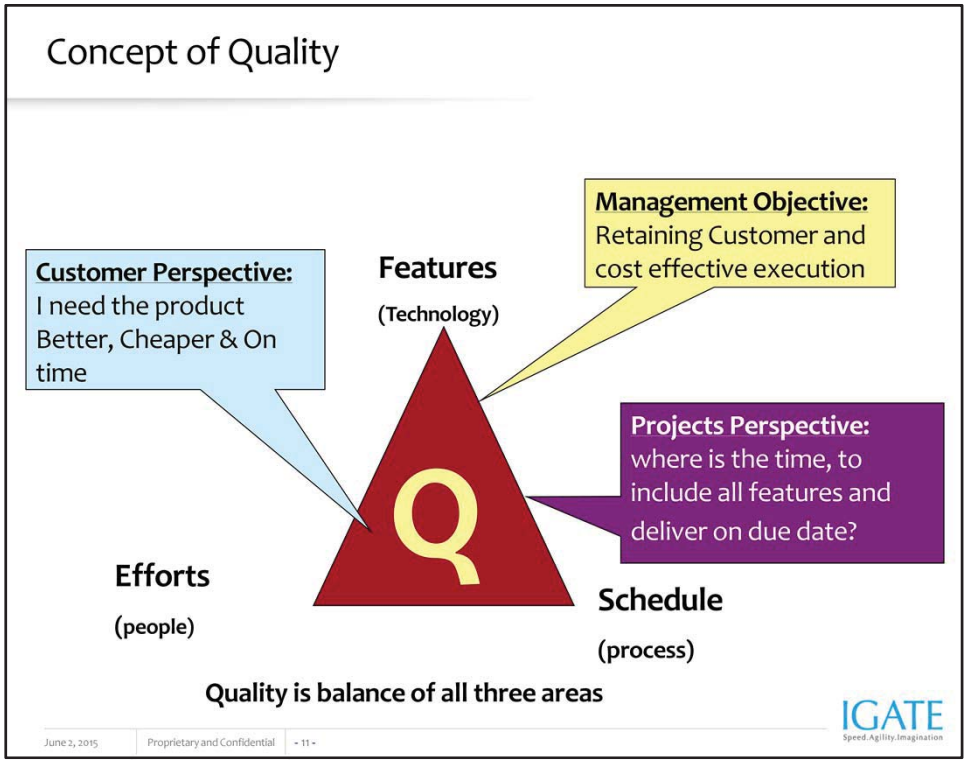
Quality - What ?

- **Simply put , quality means a state which is free from defects , deviations and variations and is cost effective**
- **ISO defines quality as ability of a service or product to satisfy the stated or implied needs of the customer**
- **Developing Quality product /service means**
  - Meeting the customer explicit and implicit requirements
  - Delivering on time and in full
  - Defect free service within cost and schedule
  - Being flexible and responsive to desired changes
  - Co-operating
  - Improving own performance


Concept of Quality
Management Objective:
Retaining Customer and cost effective execution
Customer Perspective:
I need the product Better, Cheaper & On time
Features
(Technology)
Projects Perspective:
where is the time, to include all features and deliver on due date?
Q
Efforts
(people)
Schedule
(process)
Quality is balance of all three areas
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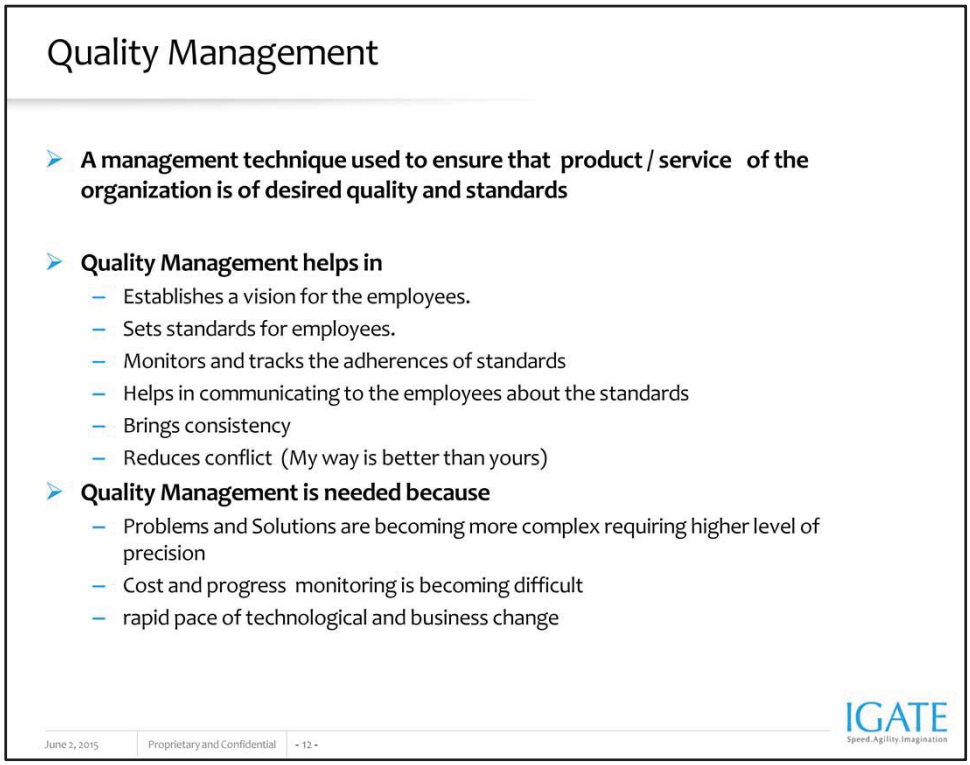
Quality Management
A management technique used to ensure that product / service of the organization is of desired quality and standards
Quality Management helps in
Establishes a vision for the employees.
Sets standards for employees.
Monitors and tracks the adherences of standards
Helps in communicating to the employees about the standards
Brings consistency
Reduces conflict (My way is better than yours)
Quality Management is needed because
Problems and Solutions are becoming more complex requiring higher level of precision
Cost and progress monitoring is becoming difficult
rapid pace of technological and business change
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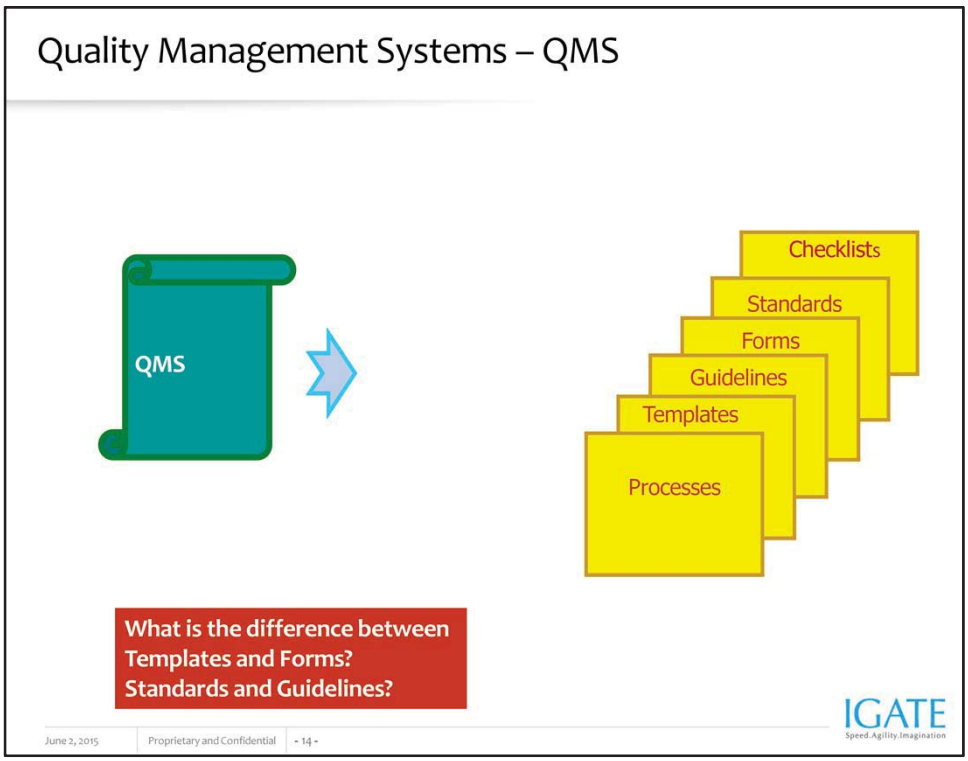
Quality Management Systems – QMS

- **A system of as the organizational structure, procedures, processes and resources needed to implement to implement quality management**

- **Elements of QMS**
  - **Standard Operating documentation**
    - Processes, guidelines, and standards
    - Templates and forms for record keeping
  - **Documentation classification**
    - Public, Sensitive etc
  - **Audit /QA procedure**
    - Internal audit , reporting and
  - **Defect and Rework procedure**
  - **Training of employees**

IGATE QMS is known as Qzen



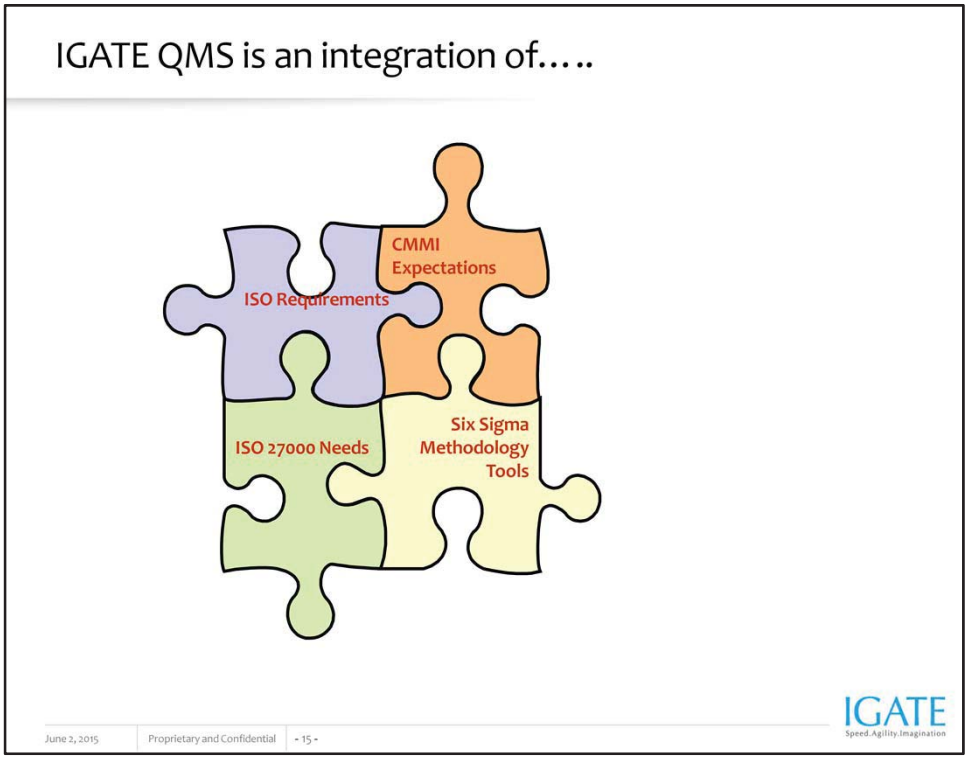
Forms cannot be changes whereas templates can be customized as per requirements

Standards consist of specific **low level mandatory controls** that help enforce and support the policy.

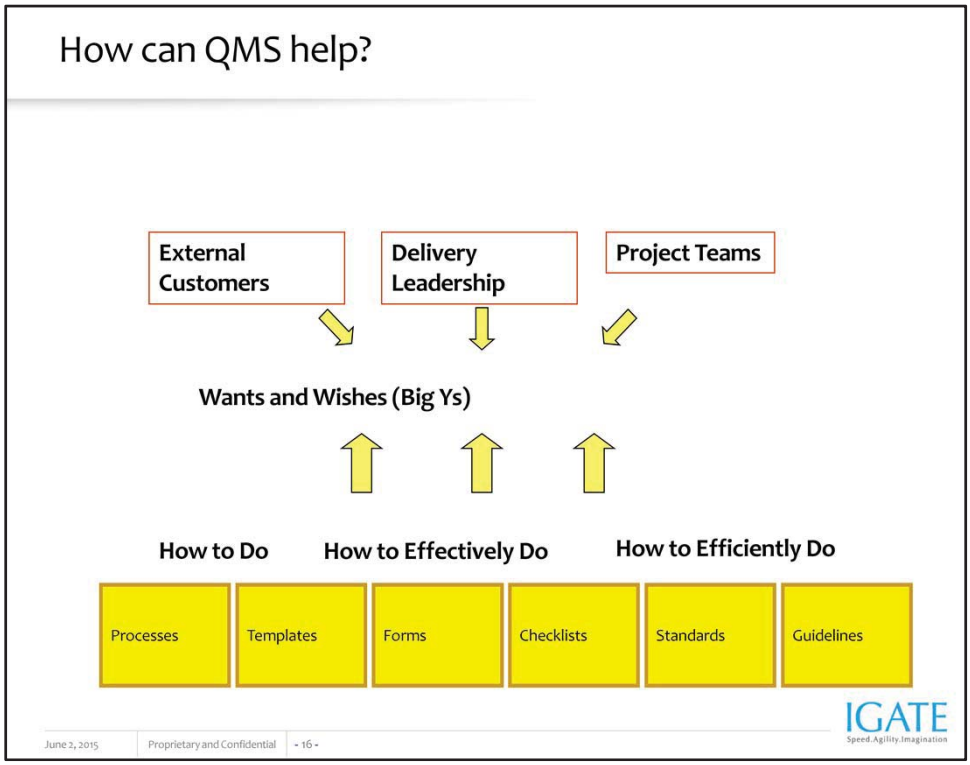
Guidelines consist of **recommended, non-mandatory controls** that help support standards or serve as a reference when no applicable standard is in place.

Process

Procedures consist of **step by step instructions** to assist workers in implementing the various policies, standards and guidelines.



iGATE's QMS is a blend of:
ISO, CMM, BS 7799 and Six Sigma
Following QMS ensures that the objectives of all of these standards and methodologies are met.
ISO was developed originally for the manufacturing segment and later found acceptance for service organizations as well, in the Europe market
CMM was developed with a focus on Software organizations and has a higher visibility in the US market
BS 7799 standards focus on security aspects and is increasingly looked at by customers
Six Sigma is a methodology that promotes achieving the objectives of Defect Prevention and Continuous Improvement
The goals of all these are same – Customer Satisfaction and Continuous Improvement and they are all synergistic in nature.


How can QMS help?
External Customers
Delivery Leadership
Project Teams
Wants and Wishes (Big Ys)
How to Do
How to Effectively Do
How to Efficiently Do
Processes
Templates
Forms
Checklists
Standards
Guidelines
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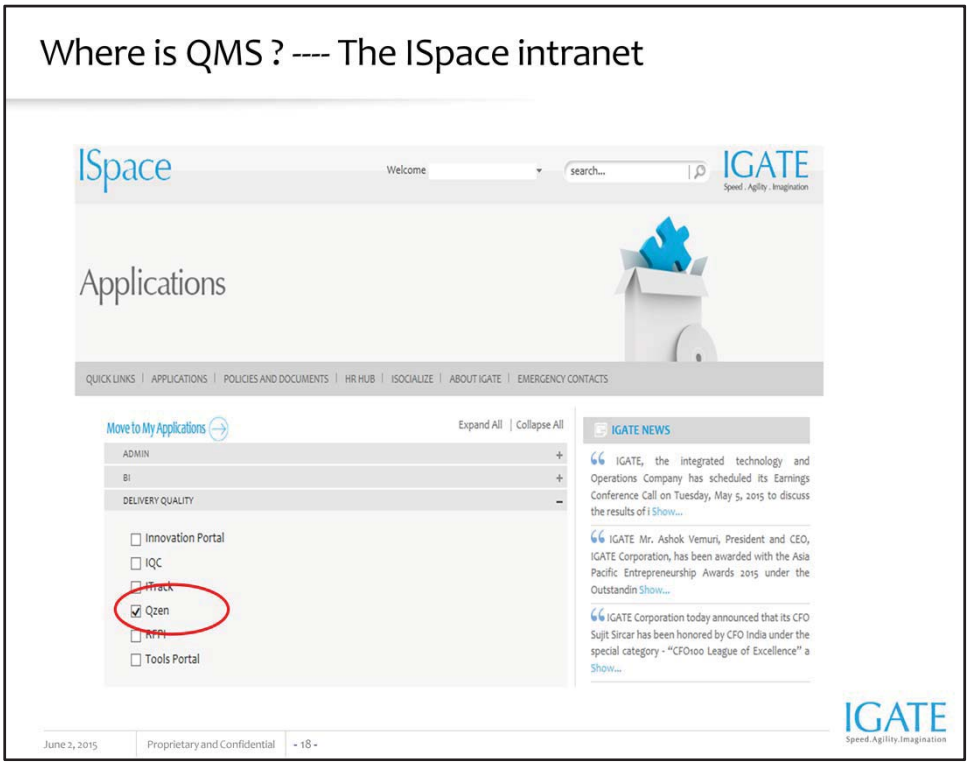
Branded QMS?

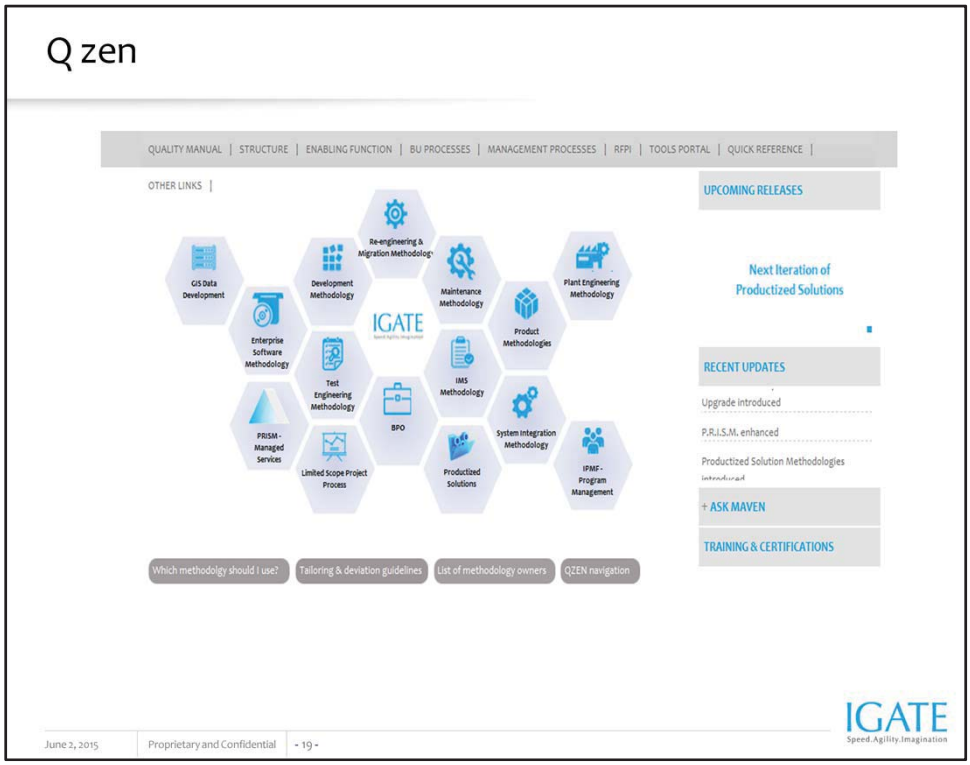
Why do we need Qzen?

- **Market**
  - Customers comfort in branded methodology of vendor
  - Peer Pressure
  - Creating a differentiator in the market place
  - Delivering Speed with Consistent Predictability

- **Delivery**
  - Details of software engineering practices
  - De-risk projects and reduce escalations
  - Building Customer Confidence
  - Handling of Large engagement successfully
  - Technology and Domain competencies creation and retention (upper life cycle skills)
  - Flattening of pyramid requiring deskilling
  - Working as Global teams
  - Clear, crisp and easy to understand process

Where is QMS ? ---- The ISpace intranet




Q zen
QUALITY MANUAL | STRUCTURE | ENABLING FUNCTION | BU PROCESSES | MANAGEMENT PROCESSES | RFPI | TOOLS PORTAL | QUICK REFERENCE |
OTHER LINKS |
GIS Data Development
Enterprise Software Methodology
PRISM - Managed Services
Development Methodology
Test Engineering Methodology
Limited Scope Project Process
Re-engineering & Migration Methodolog
IGATE
BPO
Maintenance Methodology
IMS Methodology
Productized Solutions
Product Methodologies
System Integration Methodology
Plant Engineering Methodology
IPMF - Program Management
Which methodolgy should I use?
Tailoring & deviation guidelines
List of methodology owners
QZEN navigation
UPCOMING RELEASES
Next Iteration of Productized Solutions
RECENT UPDATES
Upgrade introduced
P.R.I.S.M. enhanced
Productized Solution Methodologies
+ ASK MAVEN
TRAINING & CERTIFICATIONS
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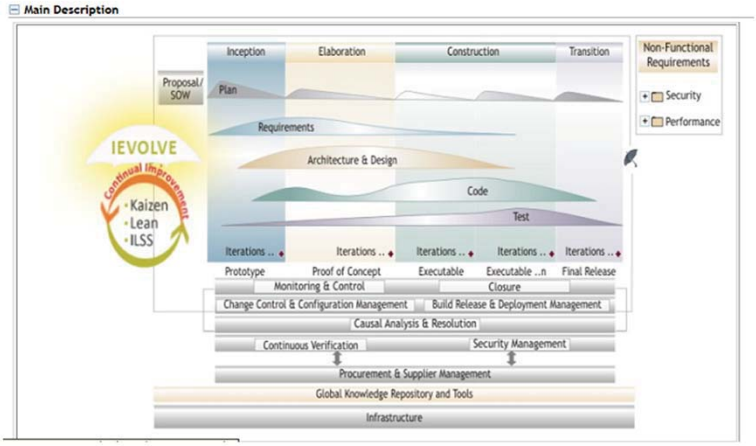
Development Methodology

Main Description



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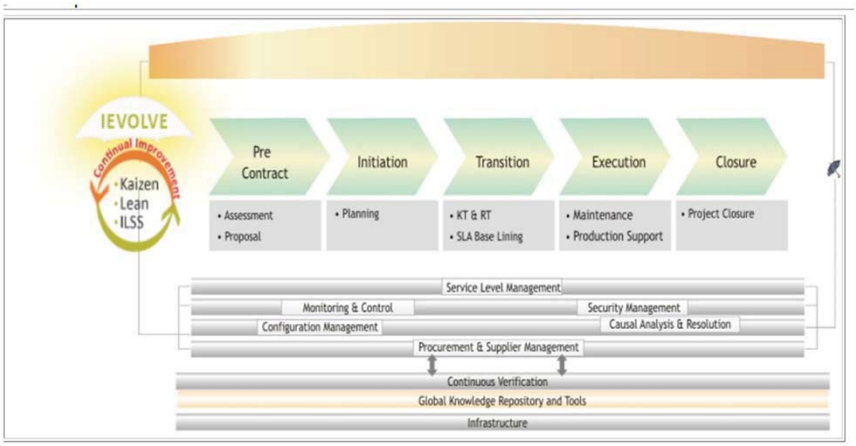
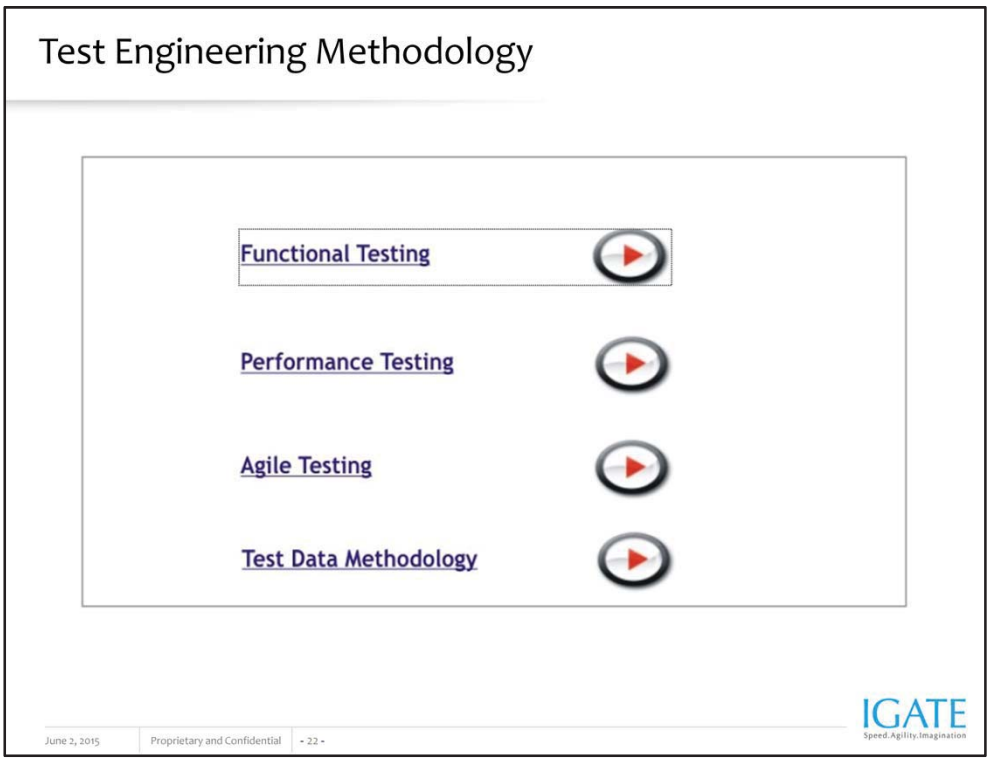
Maintenance Methodology




Test Engineering Methodology
Functional Testing
Performance Testing
Agile Testing
Test Data Methodology
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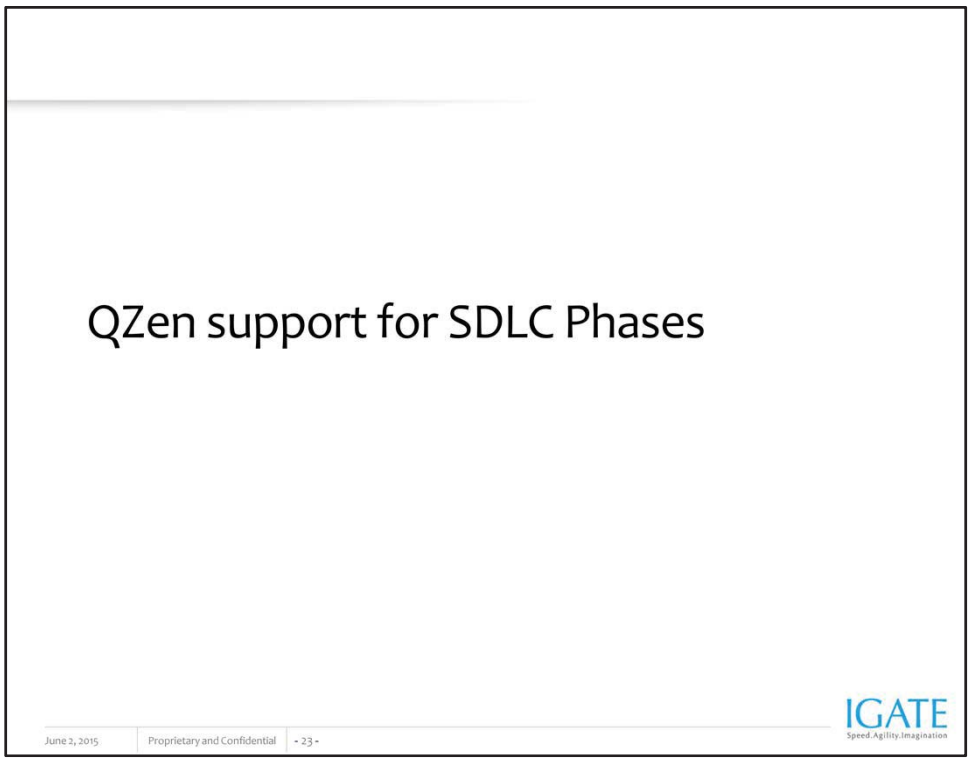
QZen support for SDLC Phases
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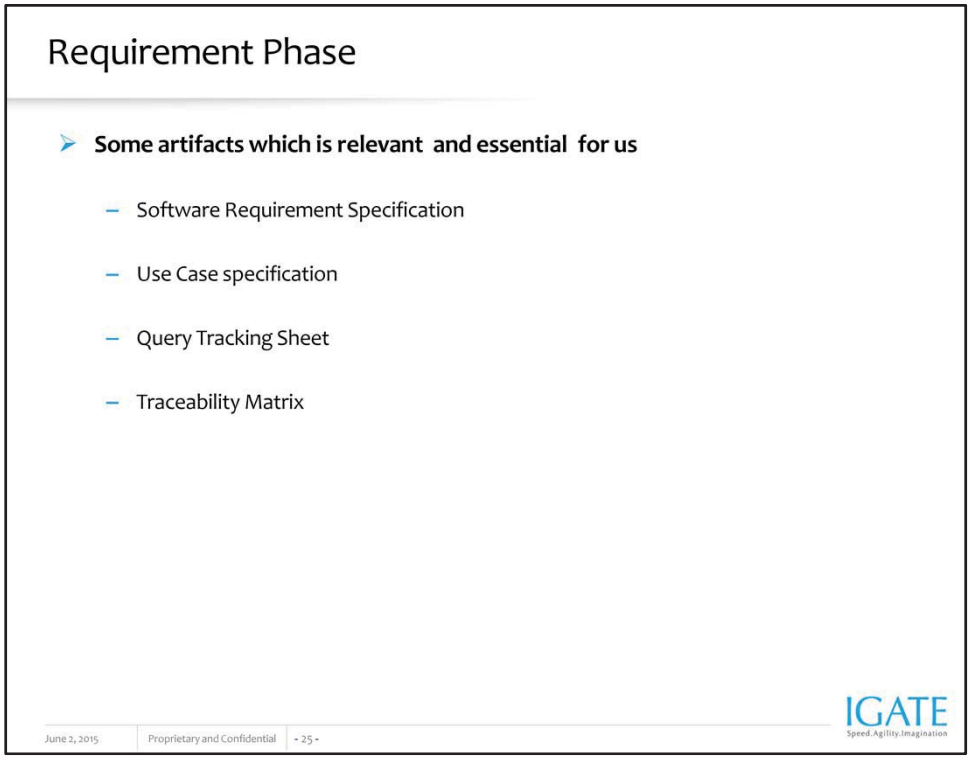
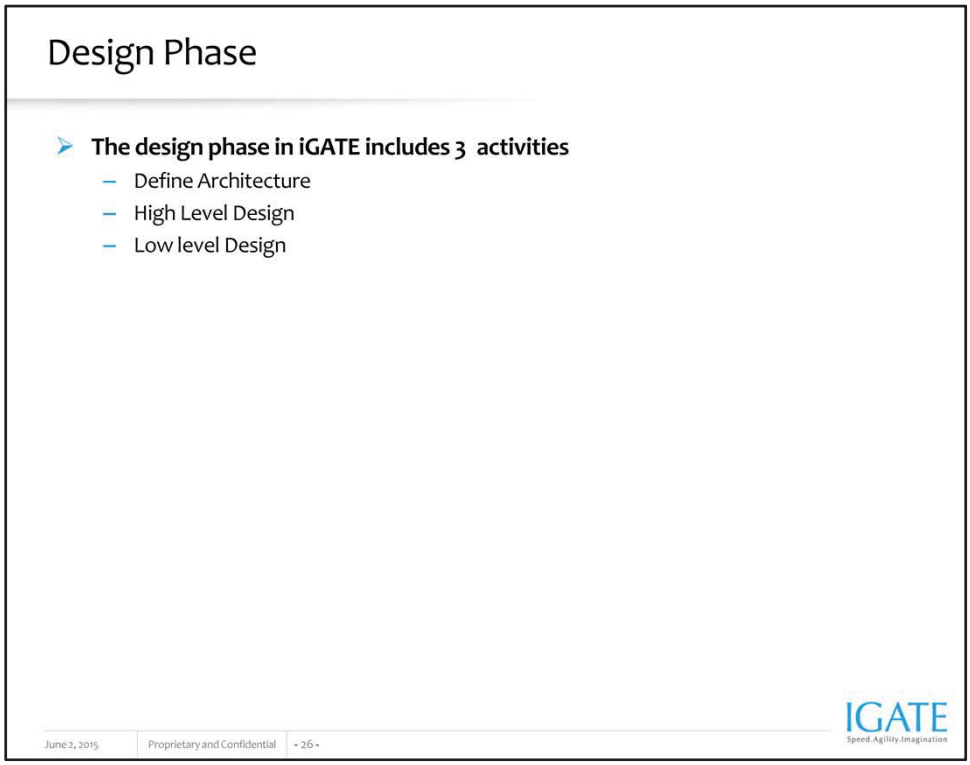
Requirement Phase

- Requirement Process flow
- Task list for each activity in Requirements
- Templates for capturing requirements - functional & non functional
- Checklists for review
- Guidelines for Requirement Development
- Change Management process
- Tools for requirement readiness

Note : We will not be discussing Requirement phase in detail at this juncture



Though as software engineers we may not be involved directly in Requirements phase . We may be required to update /go thru the following documents . These


Design Phase
The design phase in iGATE includes 3 activities
Define Architecture
High Level Design
Low level Design
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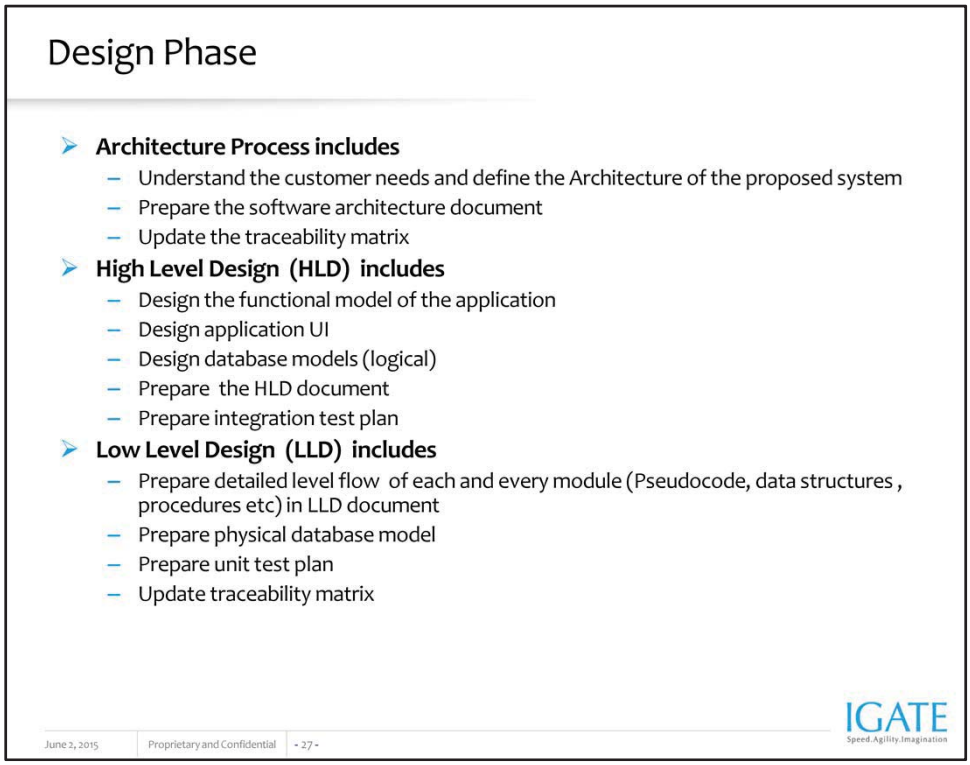
Design Phase
Architecture Process includes
Understand the customer needs and define the Architecture of the proposed system
Prepare the software architecture document
Update the traceability matrix
High Level Design (HLD) includes
Design the functional model of the application
Design application UI
Design database models (logical)
Prepare the HLD document
Prepare integration test plan
Low Level Design (LLD) includes
Prepare detailed level flow of each and every module (Pseudocode, data structures , procedures etc) in LLD document
Prepare physical database model
Prepare unit test plan
Update traceability matrix
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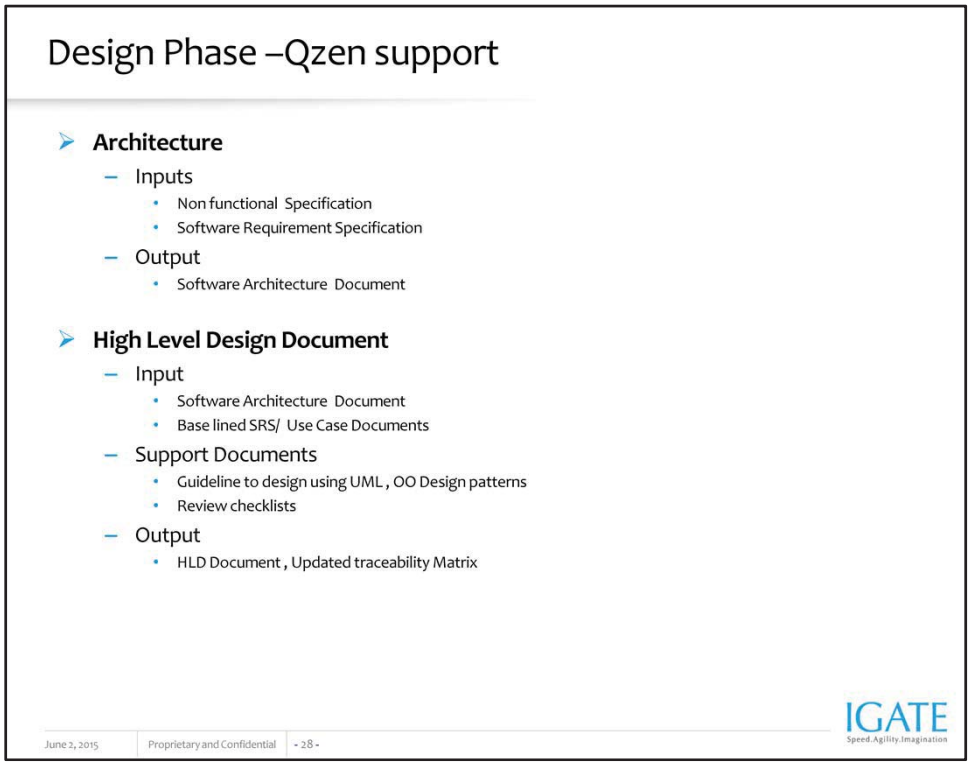
Design Phase –Qzen support
Architecture
Inputs
Non functional Specification
Software Requirement Specification
Output
Software Architecture Document
High Level Design Document
Input
Software Architecture Document
Base lined SRS/ Use Case Documents
Support Documents
Guideline to design using UML , OO Design patterns
Review checklists
Output
HLD Document , Updated traceability Matrix
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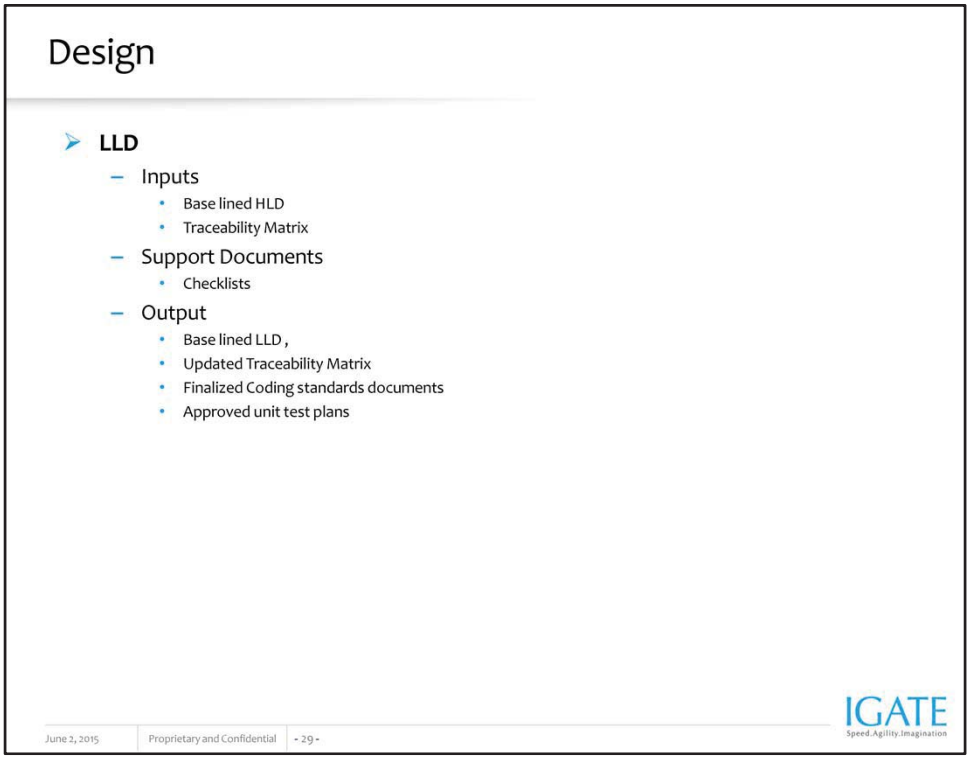
Design
LLD
Inputs
Base lined HLD
Traceability Matrix
Support Documents
Checklists
Output
Base lined LLD ,
Updated Traceability Matrix
Finalized Coding standards documents
Approved unit test plans
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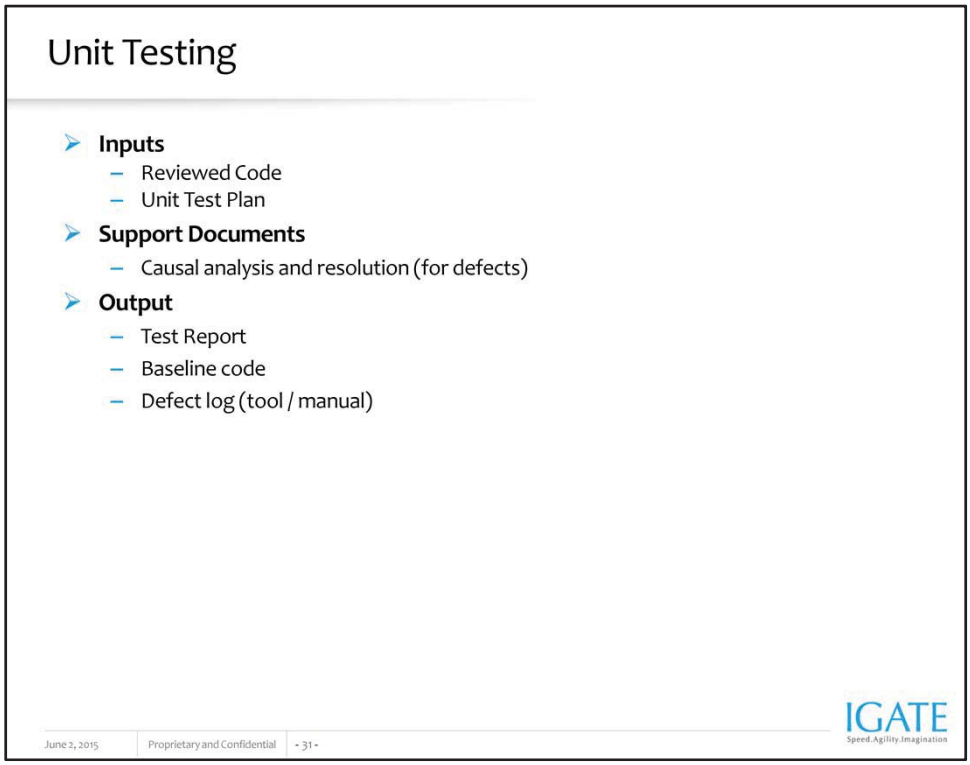
Construction Phase –Qzen support

- **Inputs**
  - Base lined Low Level Design
  - Base lined Unit Test Plan
  - Re-usable components
  - Traceability Matrix
- **Support Documents**
  - Code review checklists (self and peer)
  - Coding Standards and guidelines
  - Continuous Integration plan
- **Output**
  - Reviewed Code
  - Defect logs (system /excel)


Unit Testing
Inputs
Reviewed Code
Unit Test Plan
Support Documents
Causal analysis and resolution (for defects)
Output
Test Report
Baseline code
Defect log (tool / manual)
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Metrics
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Measurement

- **Measurement: Measurement is the numerical value assigned to an entity**
  - It is always associated with a unit
  - e.g. If I want to measure the weight of a brick I will not say it is 2.5. I will always say it is 2.5 KG
- **Examples of Measurement are:**

  Length: 2 Meter

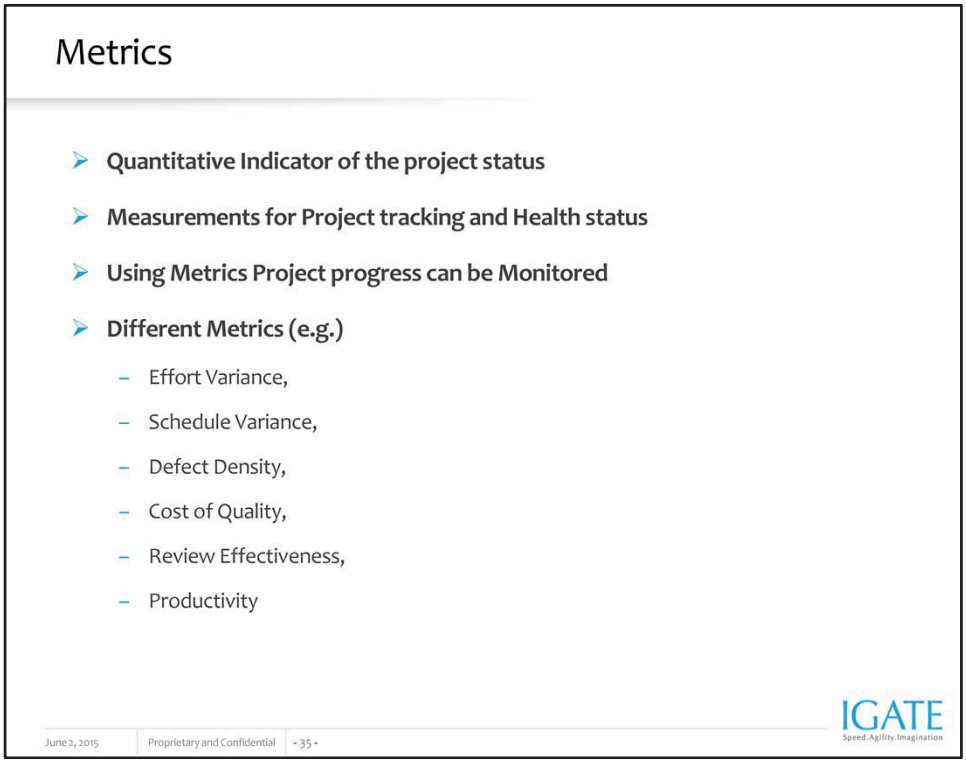
  Temperature: 298 K, 30 Degree

  Time : 60 Seconds

  Mass : 50 KG
- **Above are 4 basic measurements that we deal in physical world**

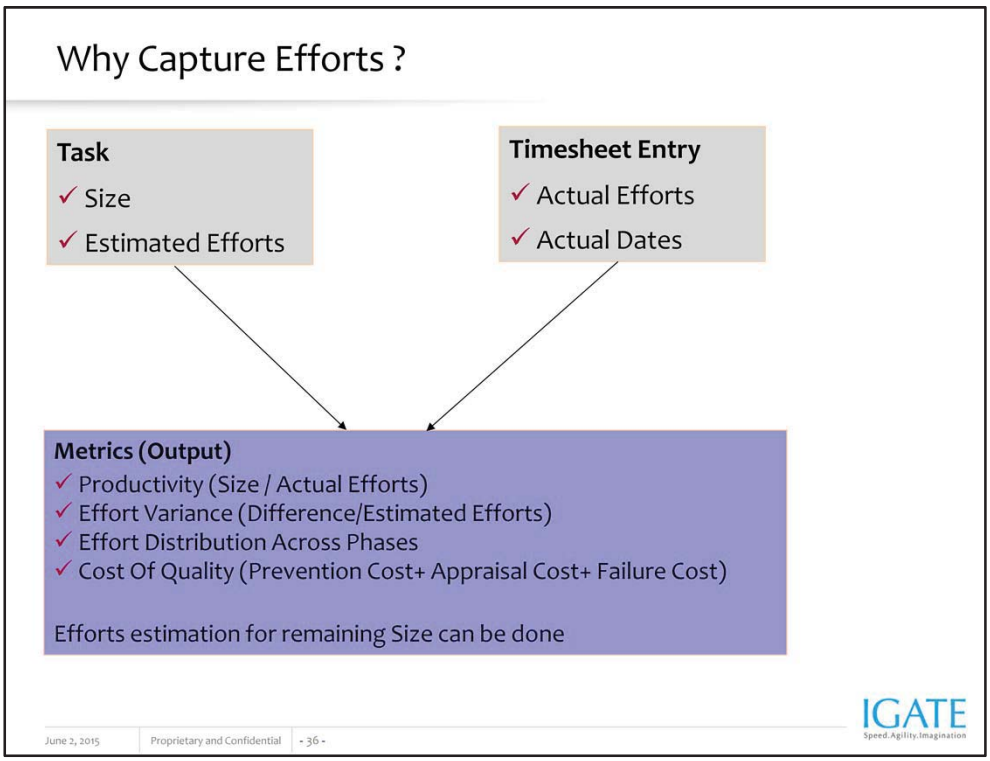
Reason for Measurement and Metrics

- Most of the time measurement and Metrics are calculated only for one reason - DECISION MAKING.
- E.g. Speed in order to control the vehicle. Carpet area to estimate the cost of the flat etc
- Data based decision making, help's us to take better decisions.
- Rule of Thumb: Do not put any effort on taking measurement and Metrics if it is not going to be used for any kind of decision making.



This slide tells about
- why Metrics?
- What are different Metrics?

Keep Link with Q triangle Perception by stake holders.


Why Capture Efforts ?
Task
✓ Size
✓ Estimated Efforts
Timesheet Entry
✓ Actual Efforts
✓ Actual Dates
Metrics (Output)
✓ Productivity (Size / Actual Efforts)
✓ Effort Variance (Difference/Estimated Efforts)
✓ Effort Distribution Across Phases
✓ Cost Of Quality (Prevention Cost+ Appraisal Cost+ Failure Cost)
Efforts estimation for remaining Size can be done
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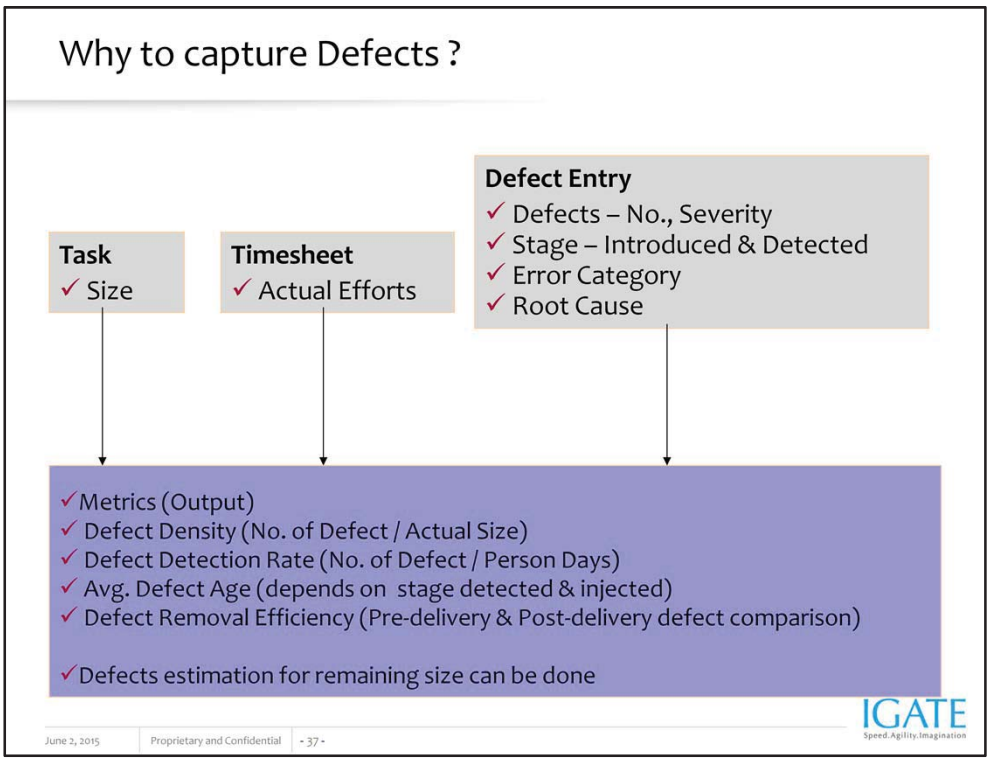
Why to capture Defects ?
Task
✓ Size
Timesheet
✓ Actual Efforts
Defect Entry
✓ Defects – No., Severity
✓ Stage – Introduced & Detected
✓ Error Category
✓ Root Cause
✓Metrics (Output)
✓ Defect Density (No. of Defect / Actual Size)
✓ Defect Detection Rate (No. of Defect / Person Days)
✓ Avg. Defect Age (depends on stage detected & injected)
✓ Defect Removal Efficiency (Pre-delivery & Post-delivery defect comparison)
✓Defects estimation for remaining size can be done
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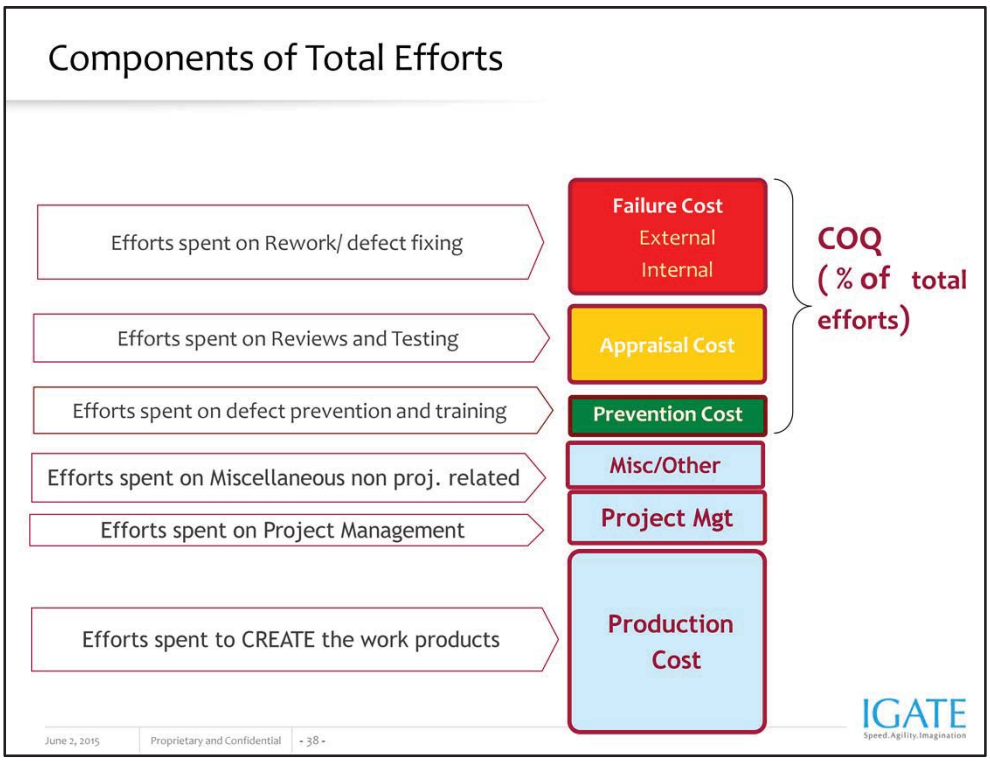
Components of Total Efforts
Efforts spent on Rework/ defect fixing
Efforts spent on Reviews and Testing
Efforts spent on defect prevention and training
Efforts spent on Miscellaneous non proj. related
Efforts spent on Project Management
Efforts spent to CREATE the work products
Failure Cost
External
Internal
Appraisal Cost
Prevention Cost
Misc/Other
Project Mgt
Production Cost
COQ
(% of total efforts)
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A Few Metrics

Defect Density
Total Defect density =
(Total number of defects including both impact and non-impact, found in all the phases + Post delivery defects)/Size

Average Defect Age =
(Sum of ((Defect detection phase number – defect injection phase number) * No of defects detected in the defect detection phase))/(Total Number of defects till date)

A Few Metrics

Defect Removal Efficiency (DRE) =
100 * No. of pre-delivery defects / Total No. of Defects

Review Effectiveness (RE) =
100 * Total no. of defects found in review / Total no. of defects

Cost of finding a defect in review (CFDR) =
Total efforts spent on reviews / No. of defects found in reviews

Cost of finding a defect in testing (CFDT) =
Cost of finding a defect in testing = (Total efforts spent on testing / defects found in testing)

A Few Metrics

Test Case Effectiveness =
No. of defects detected using the test cases * 100/ total # of defects detected in testing

Test Case Adequacy =
No. of actual Test cases * 100 / No. of test cases estimated

Defect Detection Index =
No. of defects detected in each phase / total No. of defects planned to be detected in each phase

A Few Metrics – Testing Project Related

Test Case Creation Productivity =
Total Number of Test cases created / Actual Effort in Hours

Test Case Execution Productivity =
Total Number of Test cases Executed / Actual Effort in Hours

Defect Acceptance Rate =
Total Number of Defect Accepted by client / Total Number of defects reported

% Planned Completion (TC execution)=
(Total number of test cases executed / Total Number of test cases planned) * 100

Discussion points

- Do not view metrics in isolation
- Do take corrective actions based on metrics
- Remember that Organizational Metrics baseline depend on your project's metrics

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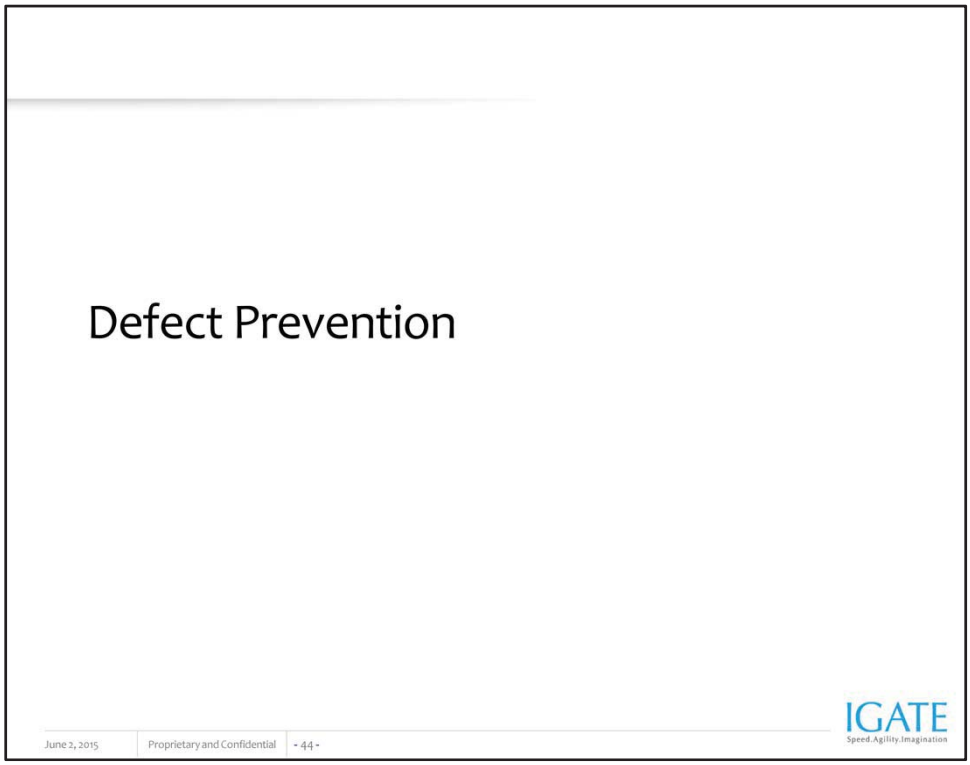
Defect Prevention
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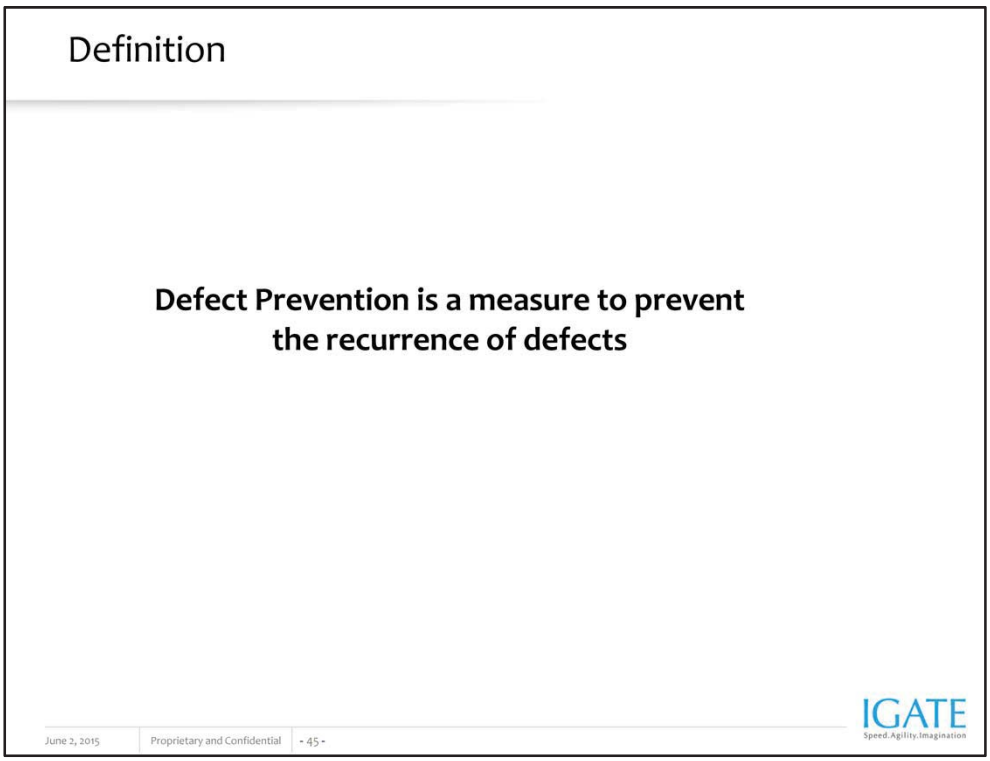
Definition
Defect Prevention is a measure to prevent the recurrence of defects
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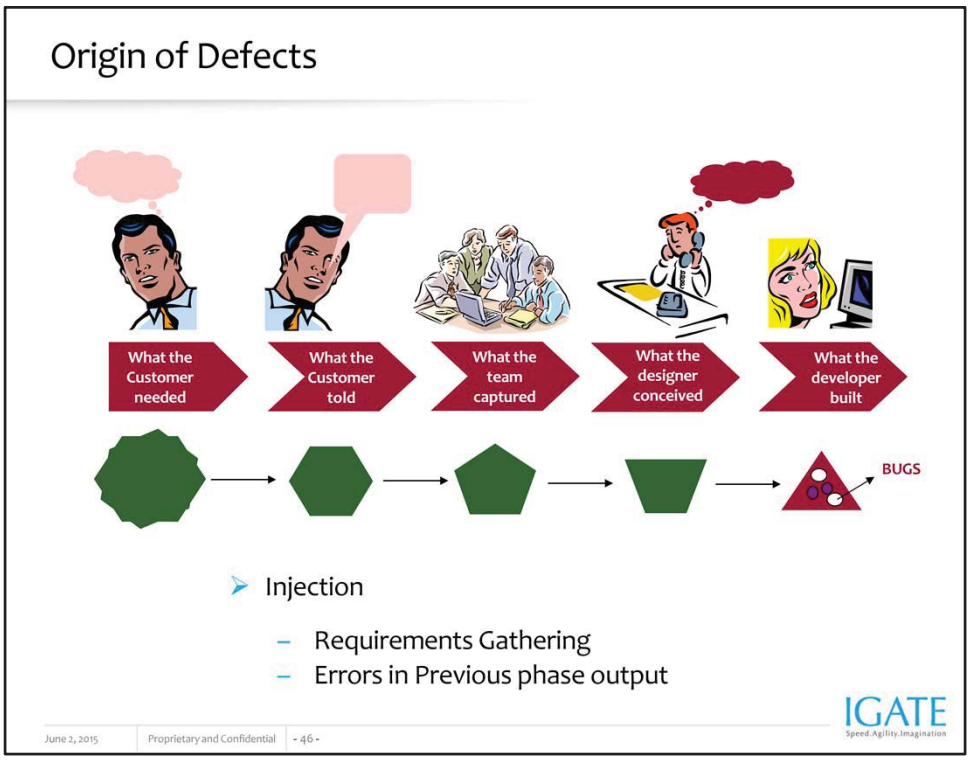
Origin of Defects
What the Customer needed
What the Customer told
What the team captured
What the designer conceived
What the developer built
BUGS
Injection
Requirements Gathering
Errors in Previous phase output
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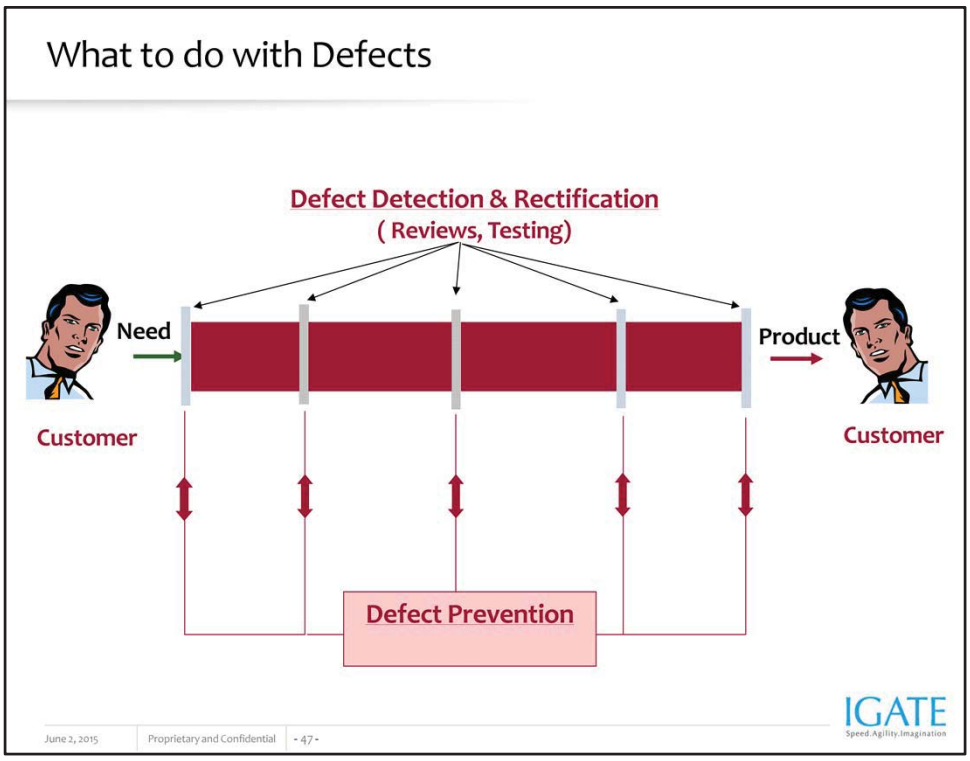
What to do with Defects
Defect Detection & Rectification
(Reviews, Testing)
Need
Product
Customer
Customer
Defect Prevention
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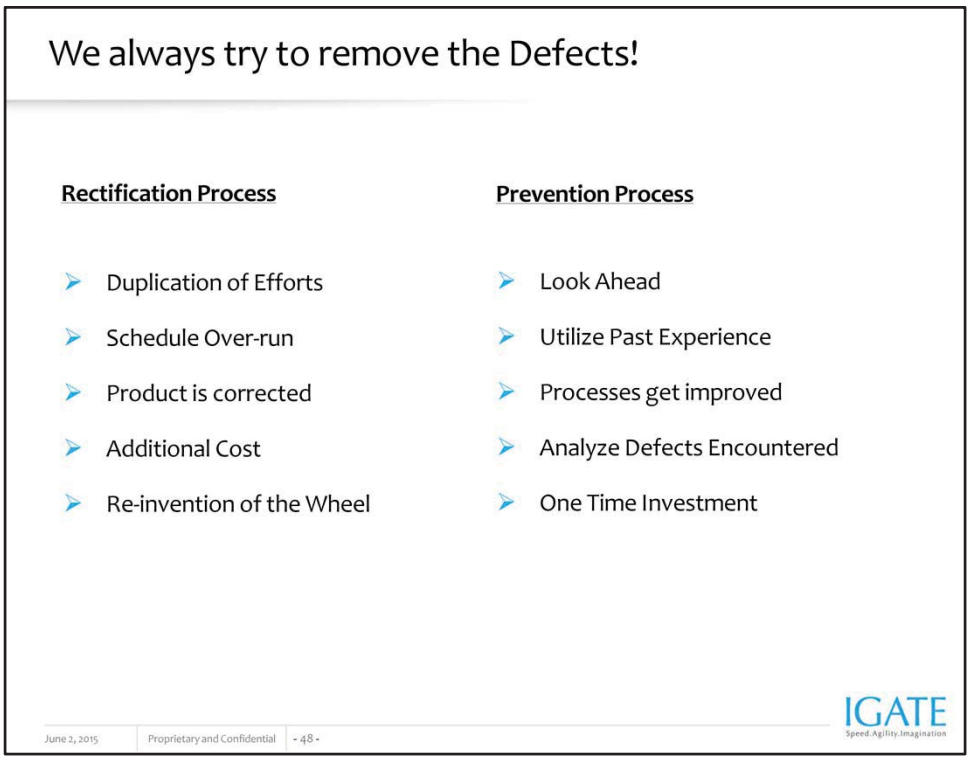
We always try to remove the Defects!
Rectification Process
Duplication of Efforts
Schedule Over-run
Product is corrected
Additional Cost
Re-invention of the Wheel
Prevention Process
Look Ahead
Utilize Past Experience
Processes get improved
Analyze Defects Encountered
One Time Investment
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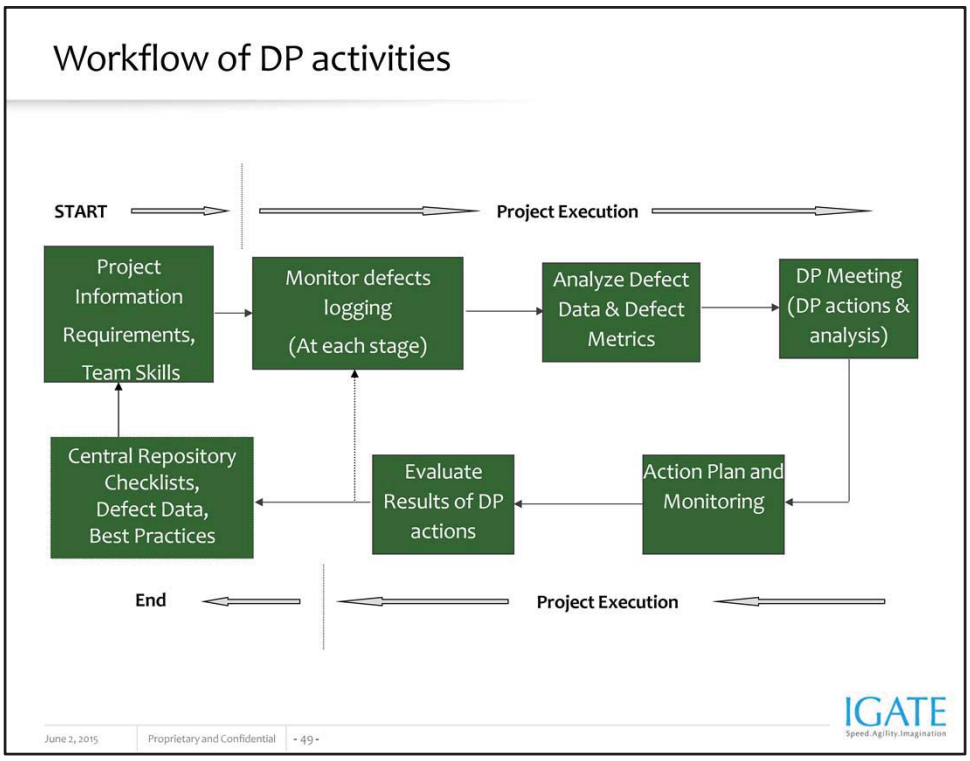
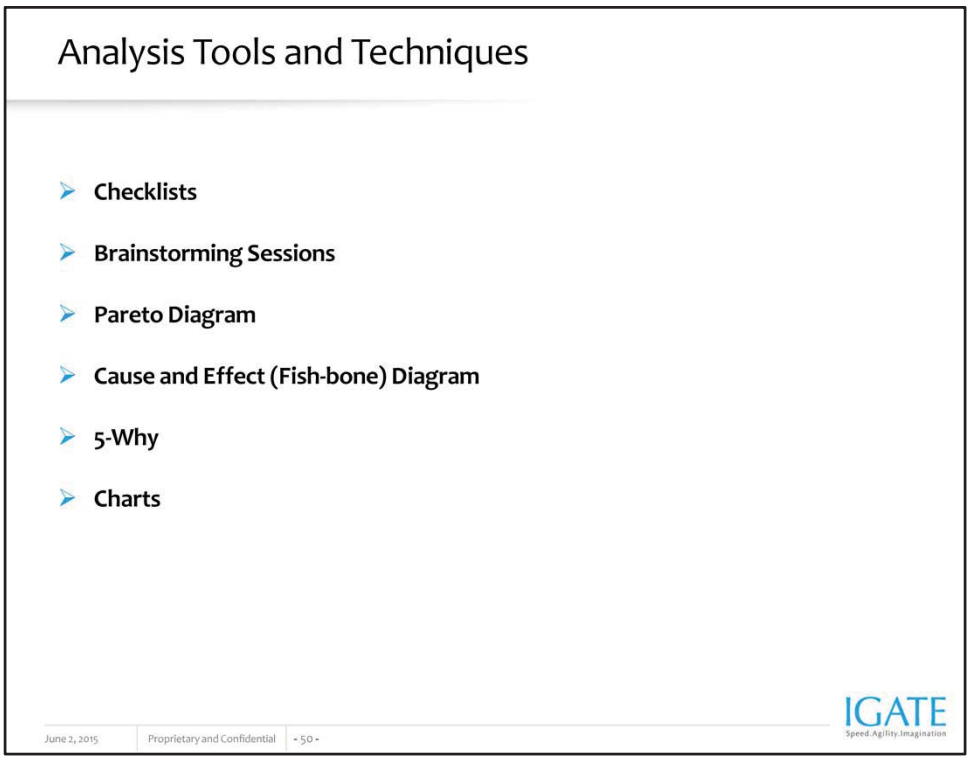


Project has 3 stages for DP activities.
In start it calls for preventing the defects from injection due to in correct usage of inputs and insufficient skills.
Execution stage defects detected are analyzed for preventing recurrence.
End stage the learning is consolidated in order to prevent organization from repeating the the same errors in other/ new projects.

Explain the stages followed by the activities in each stage and the additional facilitation to carry these activities. 3 objects overlaid.


Analysis Tools and Techniques
Checklists
Brainstorming Sessions
Pareto Diagram
Cause and Effect (Fish-bone) Diagram
5-Why
Charts
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So what is Defect Prevention?

- It's a Continuous Improvement Process
- To realize that it is OK to make mistakes
- But it is not OK to repeat mistakes
- Learn from past mistakes
- Predict what could go wrong
- Take preventive actions
- Share knowledge/information

To Summarize

- **Quality processes are followed to ensure that work is done as efficiently as possible, at the same time maintaining consistency of performance throughout the organization.**

The key Factors

Ensuring Delivery Excellence

- **Engage** – to become one with customer's Business Objective
- **Enable** – to make available Best in Class Practices
- **Excel** – to provide unsurpassable Delivery Results. Always and every time

Thank You
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