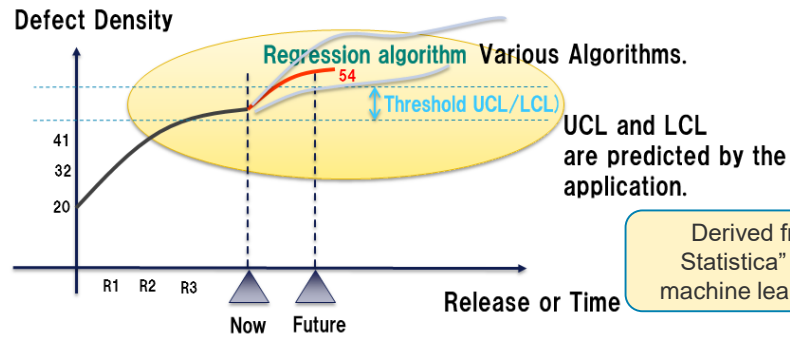


# CRESTA

Comprehensive Robotic Engine for Software Test Acceleration

# MVP (Min Value Product) Usecases – An Overview

## Usecase 1 – Prediction(故障予測)



## Usecase 3 – Test Coverage (試験項目の妥当性)

High Risk	Risk	Normal
Module 3	Module 2	Module 1
Module 5		Module 4

1 Unique to CRESTA

2 Unique to CRESTA

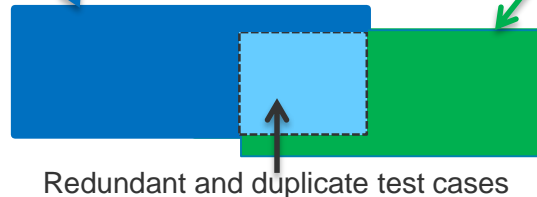
## Usecase 2 – Test Optimization (試験項目最適化)

Old(historical)test cases

Test Case ID	Test Case Description	Test Case Data	Test Case Results
1	Test Case 1	Test Case 1	Test Case 1
2	Test Case 2	Test Case 2	Test Case 2
3	Test Case 3	Test Case 3	Test Case 3

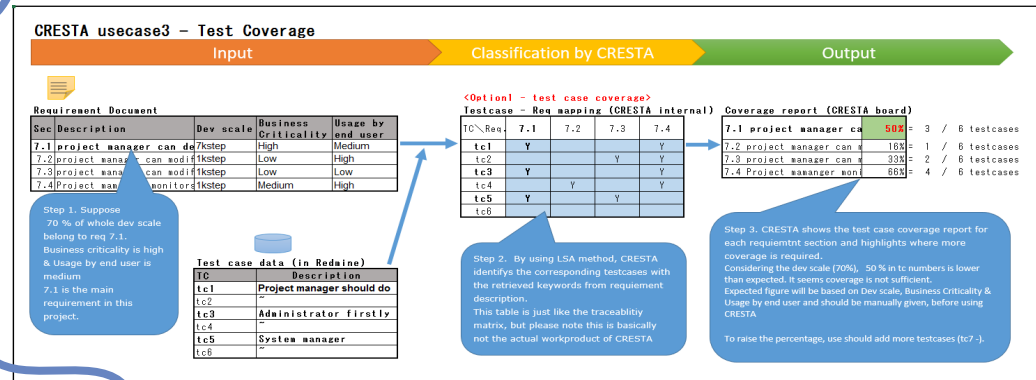
New(latest)test cases

Test Case ID	Test Case Description	Test Case Data	Test Case Results
4	Test Case 4	Test Case 4	Test Case 4
5	Test Case 5	Test Case 5	Test Case 5
6	Test Case 6	Test Case 6	Test Case 6

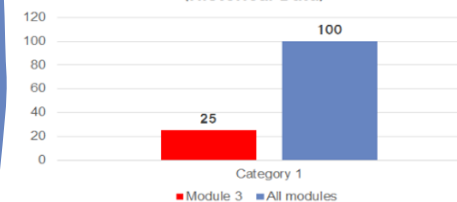


Functional test cases

Derived from "Conformiq", Tosca concepts Implementation Jubatus



Defect Detection Efficiency (Historical Data)



Derived from Tosca

3

- (1) Regression Testing Minimisation, Selection and Prioritisation : A Survey
- (2) How AI Will Change Software Development And Applications : Forrester research

Adobe Acrobat Document

Adobe Acrobat Document

# UC1: PREDICTION OF SOFTWARE QUALITY

October, 2016

# UC1: Base Minimum Value Product Use Case. (MVP)

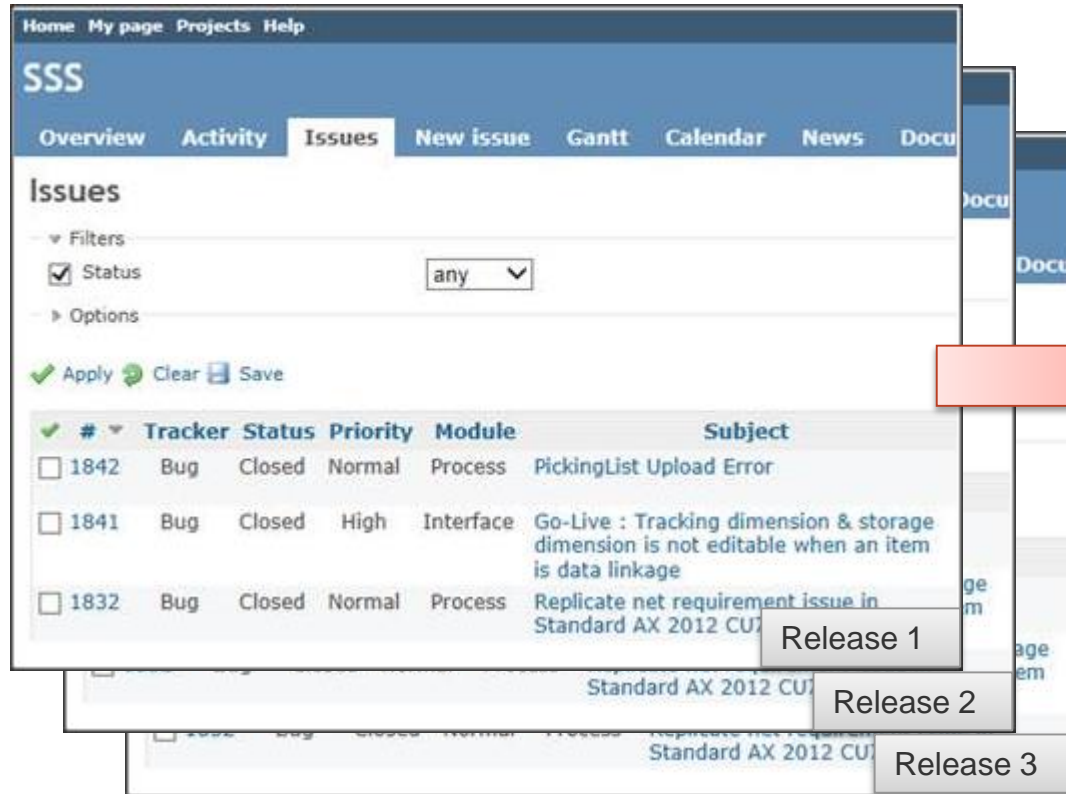
- (1) Select a Project
- (2) Select a Metric for prediction
- (3) Select Trend

■ Result :

- (1) Statistical UCL and LCL are calculated
- (2) Metric for future release is predicted
- (3) Predictions are given by various algorithms

# MVP: Predict defect density(バグ密度の予測)

What will be the defect density in future?



Historical defects data release wise

#	Tracker	Status	Priority	Module	Subject
1842	Bug	Closed	Normal	Process	PickingList Upload Error
1841	Bug	Closed	High	Interface	Go-Live : Tracking dimension & storage dimension is not editable when an item is data linkage
1832	Bug	Closed	Normal	Process	Replicate net requirement issue in Standard AX 2012 CU7

Release 1  
Release 2  
Release 3

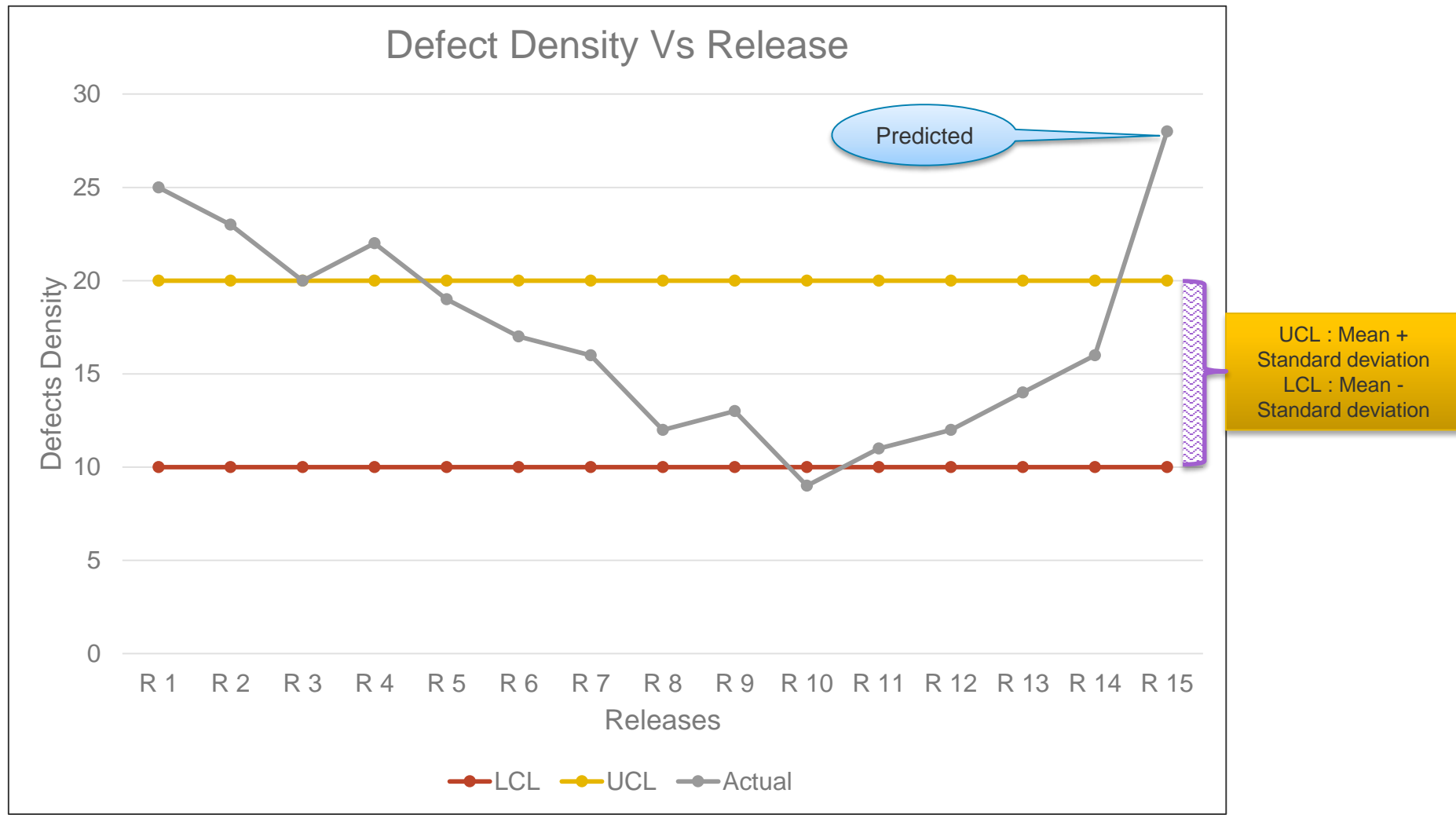
Project:

Prediction:

Trend:

Test lead clicks Predict to view prediction

# MVP: Predict defect density

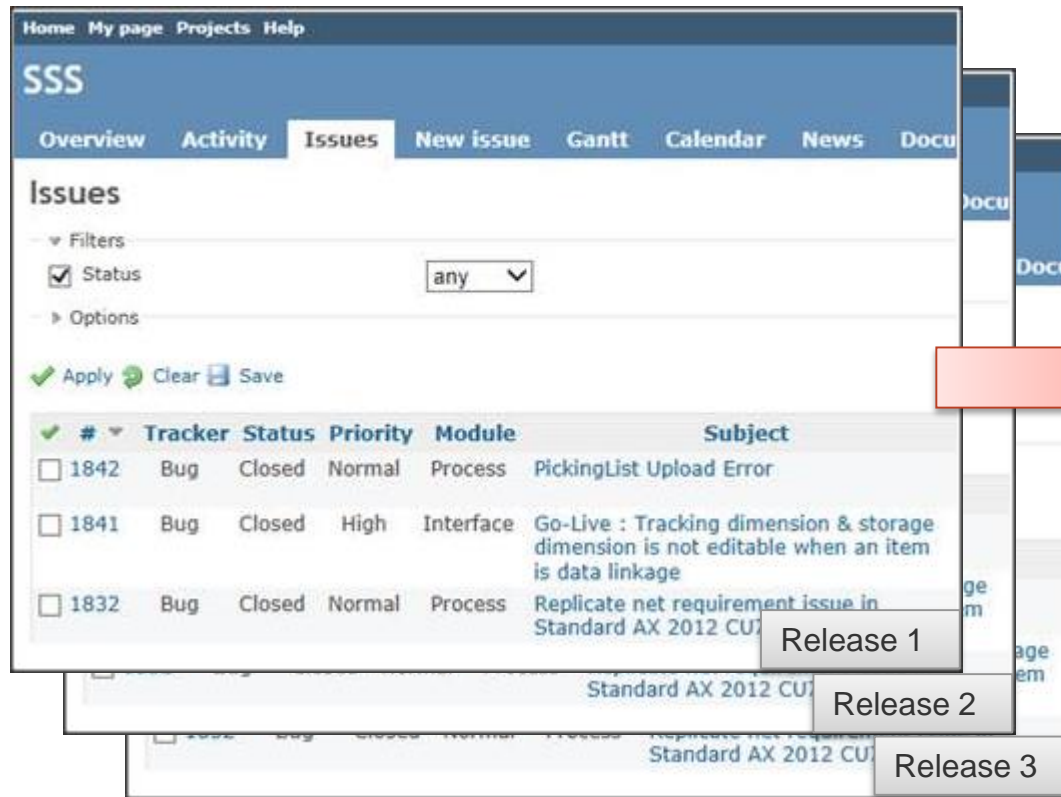


Note – Test lead will analyze based on above predictions



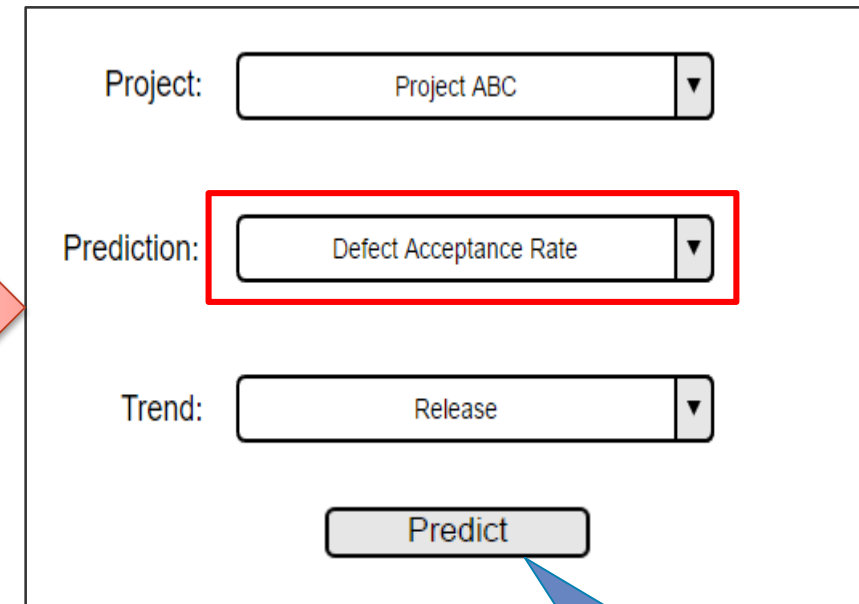
# UC1A: Predict defect acceptance rate ( 潜在バグ率の予測 )

What will be the defect acceptance rate in future?



#	Tracker	Status	Priority	Module	Subject
1842	Bug	Closed	Normal	Process	PickingList Upload Error
1841	Bug	Closed	High	Interface	Go-Live : Tracking dimension & storage dimension is not editable when an item is data linkage
1832	Bug	Closed	Normal	Process	Replicate net requirement issue in Standard AX 2012 CU

Historical defects data release wise



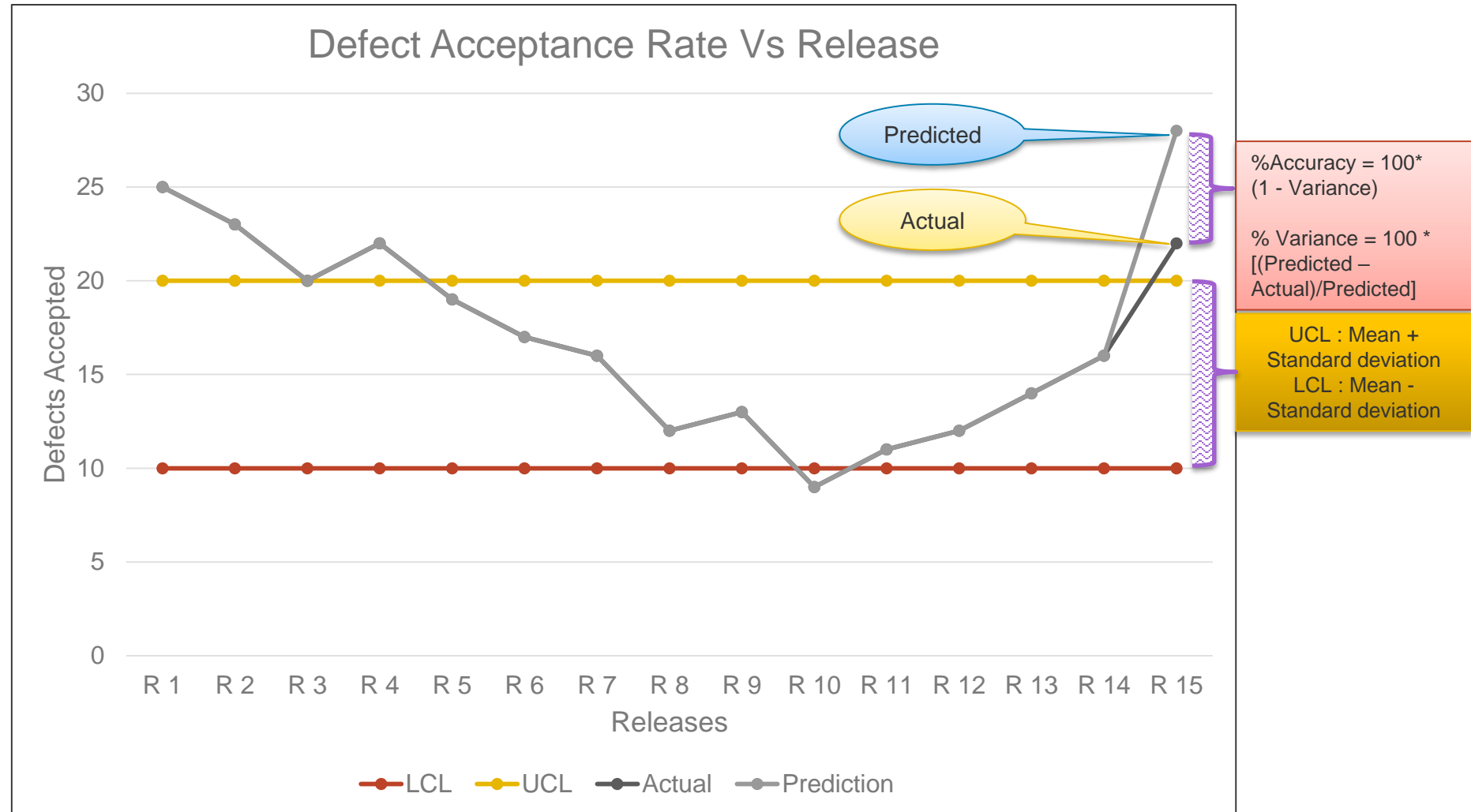
Project:

Prediction:

Trend:

Test lead clicks Predict to view prediction

# UC1A: Predict defect acceptance rate



Note – Test lead will analyze based on above predictions



# UC1B: Predict defect deferral rate ( 故障改修遅延率 )

What will be the defect deferral rate in next release?

Home My page Projects Help

SSS

Overview Activity **Issues** New issue Gantt Calendar News Documents

Issues

Filters

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Options

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#	Tracker	Status	Priority	Module	Subject
1842	Bug	Closed	Normal	Process	PickingList Upload Error
1841	Bug	Closed	High	Interface	Go-Live : Tracking dimension & storage dimension is not editable when an item is data linkage
1832	Bug	Closed	Normal	Process	Replicate net requirement issue in Standard AX 2012 CU

Release 1

Release 2

Release 3

Project:

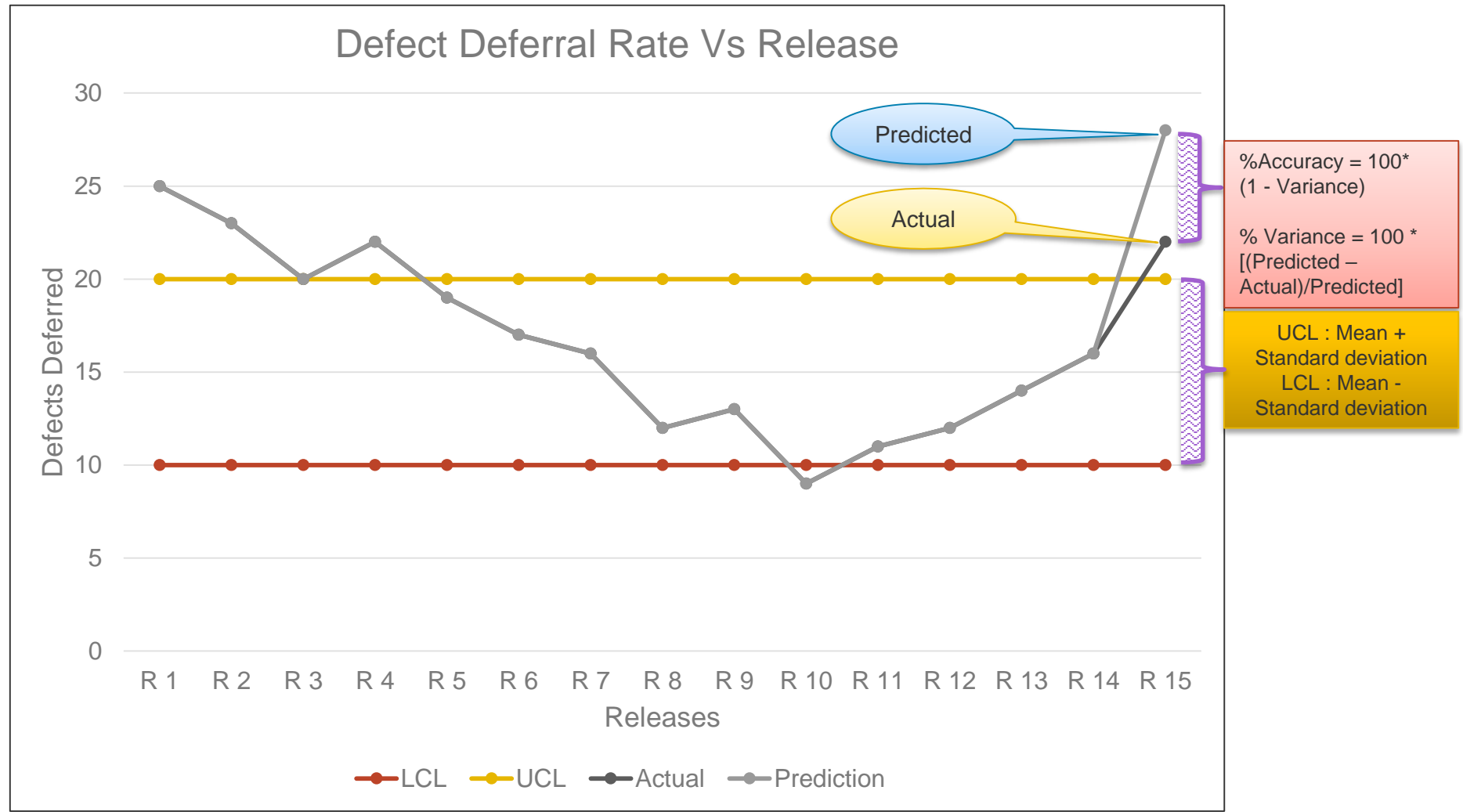
Prediction:

Trend:

Test lead clicks Predict to view prediction

Historical defects data release wise

# UC1B: Predict defect deferral rate

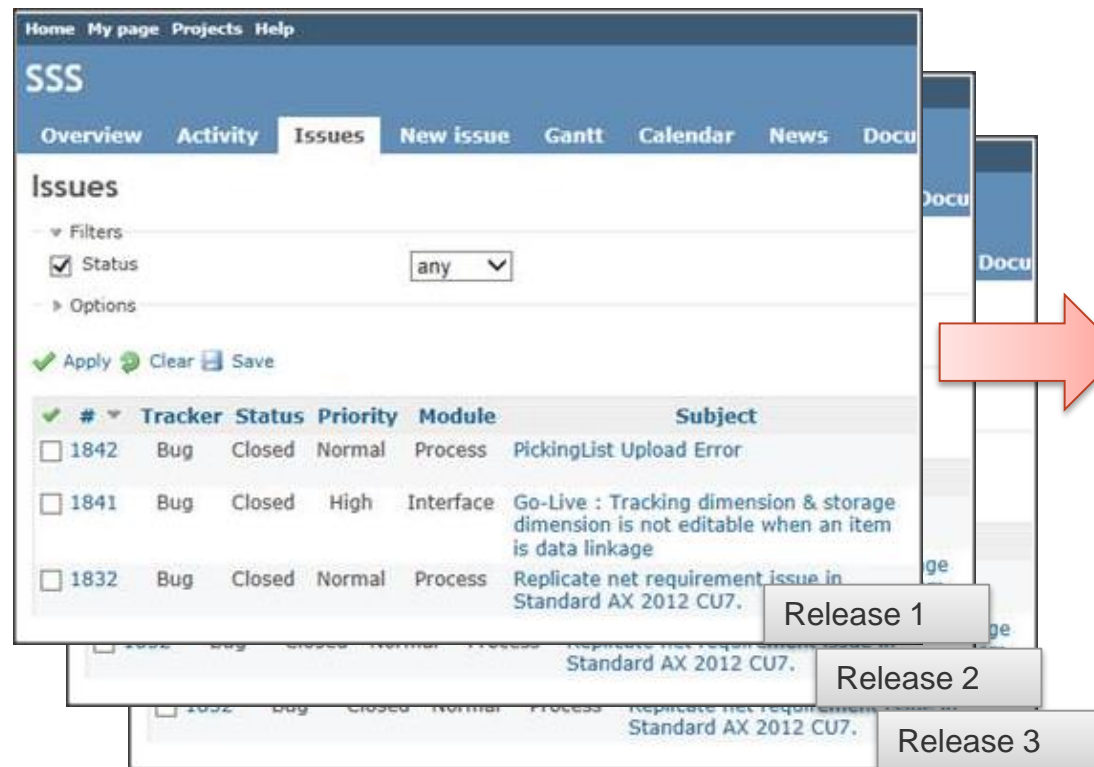


Note – Test lead will analyze based on above predictions

# UC1C: Predicted all defects vs. Actual all defects (故障数)

What will be the overall defects count in future?

All defects  
-nonfunctional  
-functional  
-performance  
-usability etc...



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Issues

Filters

☒ Status any

Options

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#	Tracker	Status	Priority	Module	Subject
1842	Bug	Closed	Normal	Process	PickingList Upload Error
1841	Bug	Closed	High	Interface	Go-Live : Tracking dimension & storage dimension is not editable when an item is data linkage
1832	Bug	Closed	Normal	Process	Replicate net requirement issue in Standard AX 2012 CU7.

Release 1

Release 2

Release 3

Project:

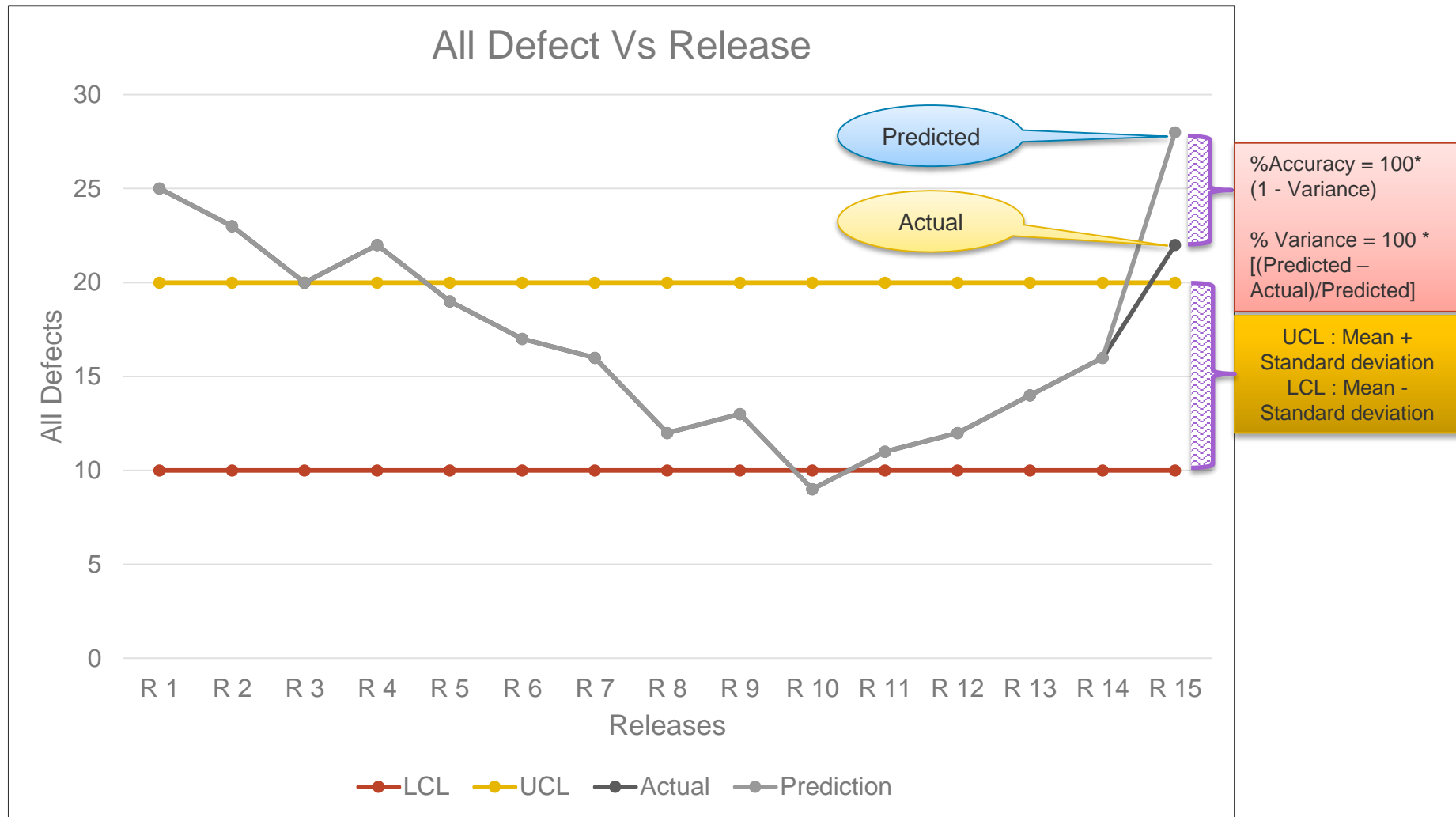
Prediction:

Trend:

Test lead clicks Predict to view prediction

Historical defects data release wise

# UC1C: Predicted all defects vs. Actual all defects

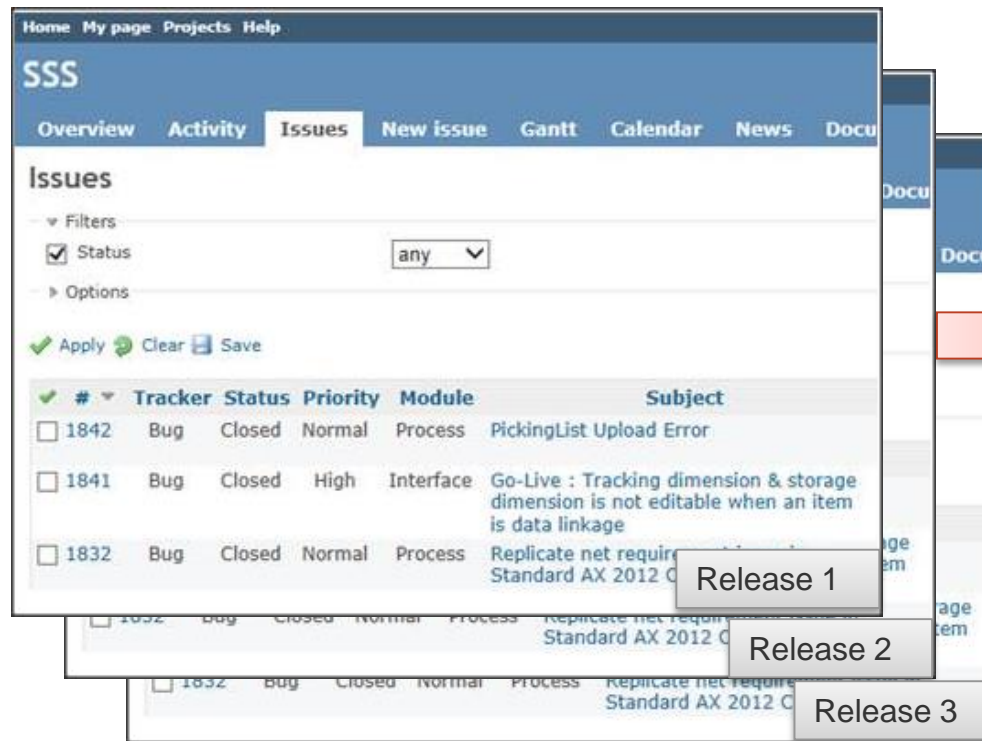


Note – Test lead will analyze based on above predictions

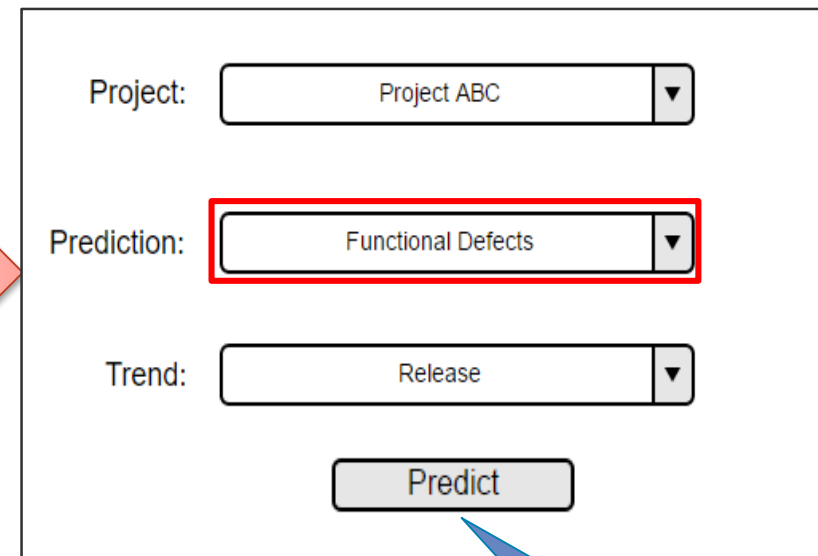
# UC1D: Predicted functional defects vs. Actual functional defects (機能試験の故障数)

What will be the functional defects count in future?

Classify for defect type  
-nonfunctional  
-**functional**  
-performance  
-usability etc...



#	Tracker	Status	Priority	Module	Subject
1842	Bug	Closed	Normal	Process	PickingList Upload Error
1841	Bug	Closed	High	Interface	Go-Live : Tracking dimension & storage dimension is not editable when an item is data linkage
1832	Bug	Closed	Normal	Process	Replicate net require Standard AX 2012 C



Project: Project ABC

Prediction: Functional Defects

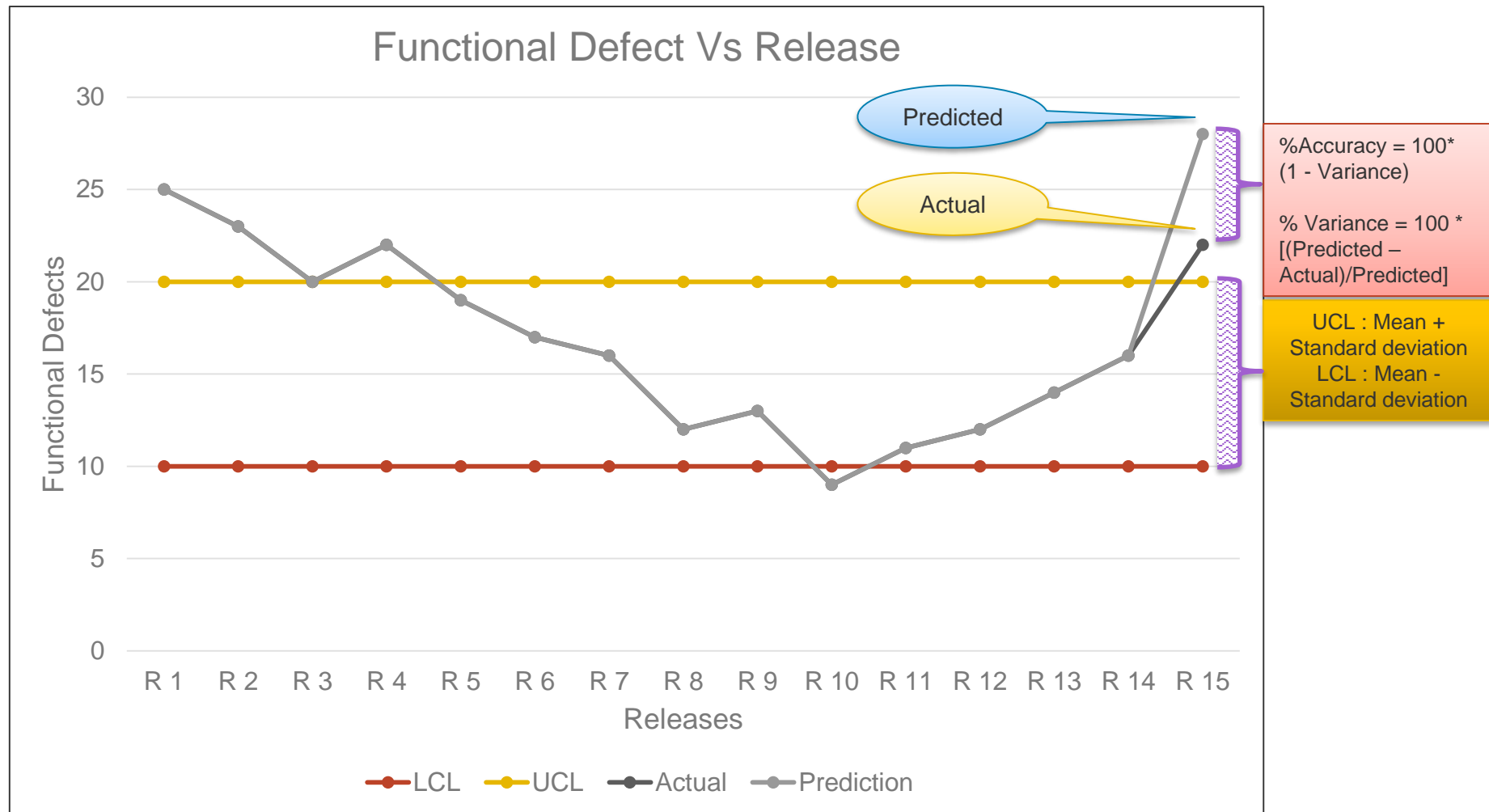
Trend: Release

Predict

Test lead clicks Predict to view prediction

Historical defects data release wise

# UC1D: Predicted functional defects vs. Actual functional defects



Note – Test lead will analyze based on above predictions



# UC3: IMPROVE TEST COVERAGE

November, 2016

# UC3: Base Minimum Value Product Use Case. (MVP)

- (1) Select a project
- (2) Select the module under consideration
- (3) Enter relevant requirement

## ■ Result :

- (1) Predict which module is defective.
- (2) Find out requirements for which test coverage is poor.

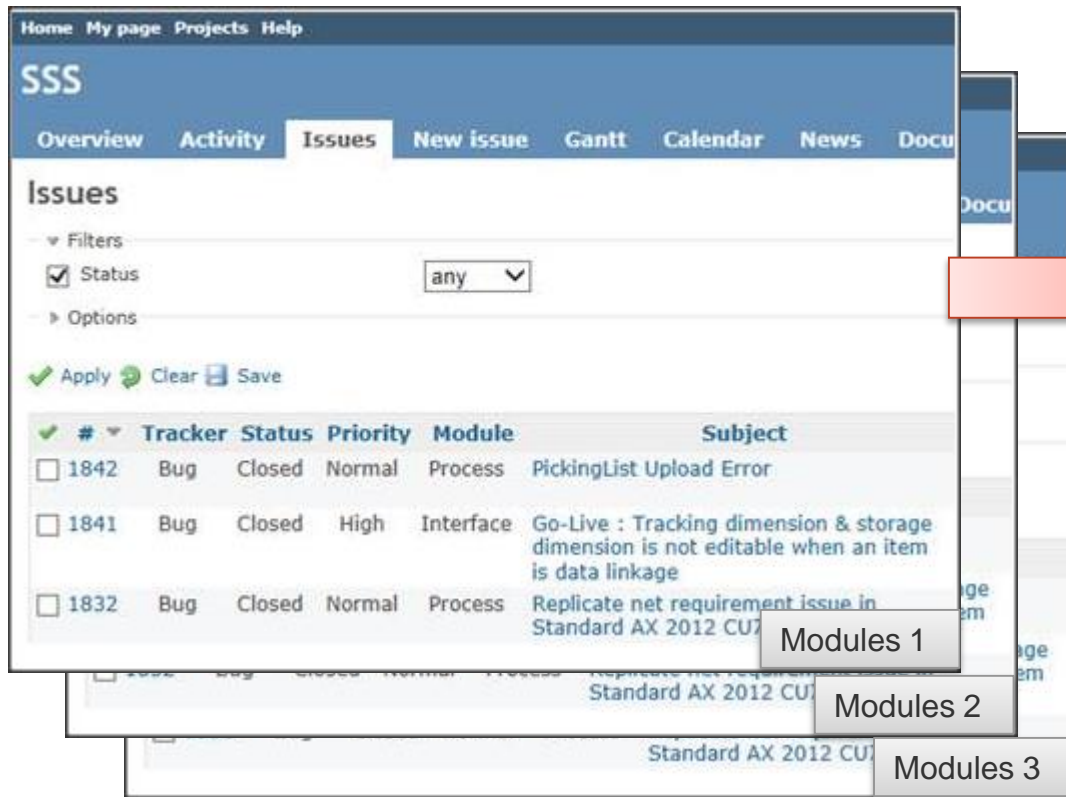
7.1. CRESTA should provide interface to setup users & roles.
7.2. CRESTA should provide four static roles(refer section 3.4 for actors list):
7.2.1. Project Manager(PM)
7.2.2. Test Lead(TL)
7.2.3. CRESTA Admin(CA)
7.2.4. Guest User(GU)
7.3. These 4 roles should be 'READ ONLY'. The Permissions of those CANNOT be modified (Edit/Remove) even by CRESTA Admin
7.4. Project Manager
7.4.1. Project manager should have permissions to define metrics for a project
7.4.2. Project manager should have permissions to configure UCL & LCL for various metrics
7.4.3. Project manager should have permissions to monitor metrics & predictions given by CRESTA
7.5. Test Lead
7.5.1. Test lead should have permissions to configure UCL & LCL for various metrics
7.5.2. Test lead should have permissions to monitor metrics & predictions given by CRESTA
7.6. CRESTA Admin
7.6.1. Only one user should be assigned to CRESTA Admin role
7.6.2. CRESTA admin should have permissions to create new project

Test Cases						
Test Case Reference ID	Test Scenario	Precondition	Test Case Description	Test Step	Test Case	Expected Results
1	User successfully predicts Defect Density Release Wise.	1.User has logged into the system with TL/PM Role and is on the home page. 2.CRESTA is connected to external defect repository Red mine	This is to verify that the TL user can predict using CRESTA as per the Prediction "Defect Density" and Trend "Release" selected	1	TL user goes to "Home" page to input prediction conditions.	On load of the Home page, system loads following data 1. Project dropdown with project list from the database <b>applicable (accessible) to logged in User</b> 2. Prediction Questions dropdown with prediction questions. 3. Trend Parameters dropdown is populated with either or both of the values "Release wise" and "Module wise" depending upon the prediction question selected.
				2	TL User selects project	Single project gets selected
				3	TL User selects "Defect Density" as prediction question	The prediction question "Defect Density" should get displayed
				4	TL User selects "Release" as trend parameter	The trend parameter "Release" should get displayed.

# MVP: Predict Defective Modules

( モジュール毎、モジュール全体の故障係数予測 )

Which modules will have difficulties during and after release?



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#	Tracker	Status	Priority	Module	Subject
1842	Bug	Closed	Normal	Process	PickingList Upload Error
1841	Bug	Closed	High	Interface	Go-Live : Tracking dimension & storage dimension is not editable when an item is data linkage
1832	Bug	Closed	Normal	Process	Replicate net requirement issue in Standard AX 2012 CU7

Modules 1

Modules 2

Modules 3

Historical defects data module wise

Project:

PREDICTION:

Trend:

Project - ABC

Defective Modules Post release

		UCL	LCL	Weightage
Defect Density	<input type="button" value="Calculate"/>	<input type="text" value="98.9"/>	<input type="text" value="30.6"/>	<input type="text" value="15"/>
Defect Leakage	<input type="button" value="Calculate"/>	<input type="text" value="98.9"/>	<input type="text" value="30.6"/>	<input type="text" value="50"/>
Defect Rejection	<input type="button" value="Calculate"/>	<input type="text" value="98.9"/>	<input type="text" value="30.6"/>	<input type="text" value="35"/>

# MVP: Predict Defective Modules

## Modules 2

### Module2

Weighted average prediction Score =  

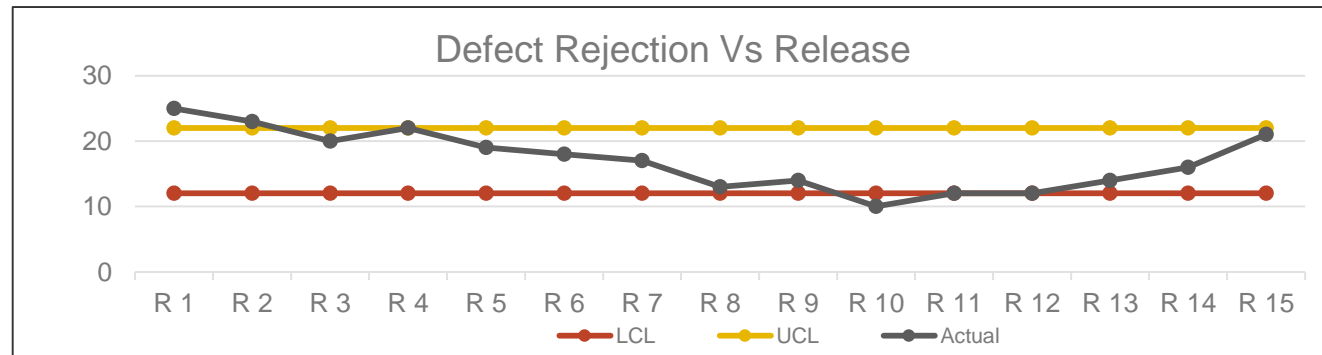
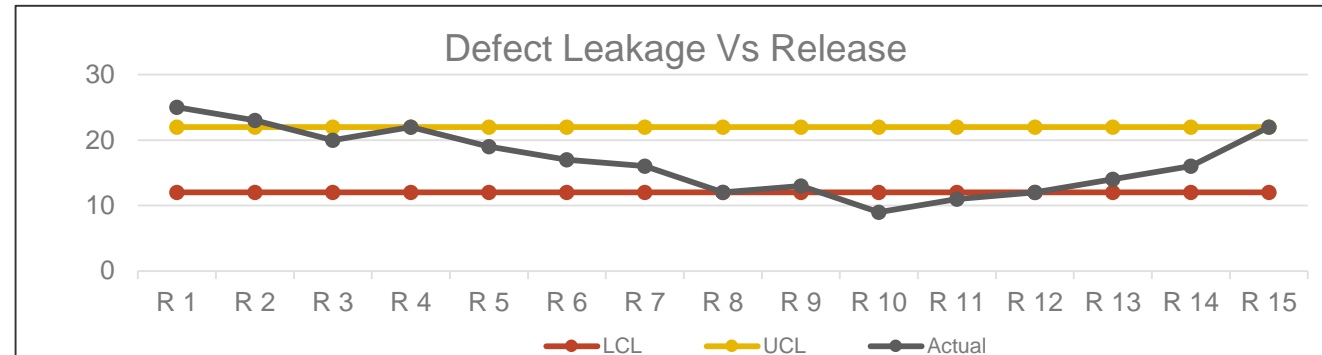
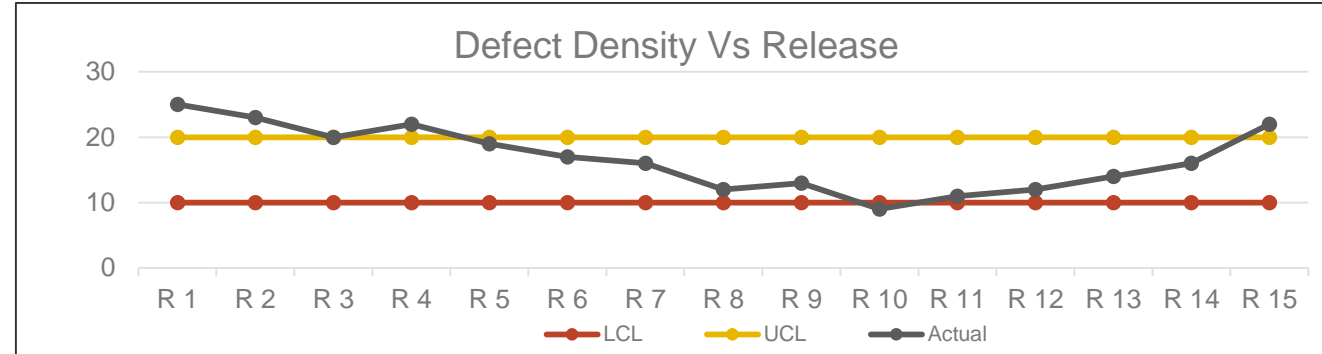
$$[(DD * \text{Weight}) + (DL * \text{Weight}) + (DR * \text{Weight})] / \text{No of metrics}$$

High Risk	Risk	Normal
<a href="#">Module 3</a>	<a href="#">Module 2</a>	<a href="#">Module 1</a>
<a href="#">Module 5</a>		<a href="#">Module 4</a>

Project manager selects a module to see details

- Mean + standard deviation
- Mean + 2 \* standard deviation
- Mean + 3 \* standard deviation

Note – R15 data is predicted data



# UC3: Identify scope for adequate test coverage of defective modules (故障モジュールの関連試験項目の特定)

- 7.1. CRESTA should provide interface to setup users & roles.
- 7.2. CRESTA should provide four static roles(refer section 3.4 for actors list):
  - 7.2.1. Project Manager(PM)
  - 7.2.2. Test Lead(TL)
  - 7.2.3. CRESTA Admin(CA)
  - 7.2.4. Guest User(GU)
- 7.3. These 4 roles should be 'READ ONLY'. The Permissions of those CANNOT be modified (Edit/Remove) even by CRESTA Admin
- 7.4. Project Manager
  - 7.4.1. Project manager should have permissions to define metrics for a project
  - 7.4.2. Project manager should have permissions to configure UCL & LCL for various metrics
  - 7.4.3. Project manager should have permissions to monitor metrics & predictions given by CRESTA
- 7.5. Test Lead
  - 7.5.1. Test lead should have permissions to configure UCL & LCL for various metrics
  - 7.5.2. Test lead should have permissions to monitor metrics & predictions given by CRESTA
- 7.6. CRESTA Admin
  - 7.6.1. Only one user should be assigned to CRESTA Admin role
  - 7.6.2. CRESTA admin should have permissions to create new project

Test Cases

Test Case Reference ID	Test Scenario	Precondition	Test Case Description	Test Step	Test Case	Expected Results
1	User successfully predicts Defect Density Release Wise.	1.User has logged into the system with TL/PM Role and is on the home page. 2.CRESTA is connected to external defect repository Red mine	This is to verify that the TL user can predict using CRESTA as per the Prediction "Defect Density" and Trend "Release" selected	1	TL user goes to "Home" page to input prediction conditions.	On load of the Home page, system loads following data 1. Project dropdown with project list from the database <b>applicable (accessible) to logged in User</b> 2. Prediction Questions dropdown with prediction questions. 3. Trend Parameters dropdown is populated with either or both of the values "Release wise" and "Module wise" depending upon the prediction question selected.
				2	TL User selects project	Single project gets selected
				3	TL User selects "Defect Density" as prediction question	The prediction question "Defect Density" should get displayed
				4	TL User selects "Release" as trend parameter	The trend parameter "Release" should get displayed.

Requirements  
Specification doc

Test Coverage

[Quality Prediction](#)  
[Test Optimization](#)  
[Test Coverage](#)  
[Adaptive Planning](#)

Project:

Module:

Requirement: 

7. Project Manager  
7.1. Project manager should have permissions to define metrics for a project  
7.2. Project manager should have permissions to configure UCL & LCL for various metrics  
7.3. Project manager should have permissions to monitor metrics & predictions given by CRESTA

Historical Data: ☐

Test case Database

User writes \  
copies  
requirement of  
Module 3.

# UC3: Identify scope for adequate test coverage of defective modules

## CRESTA usecase3 - Test Coverage



### Requirement Document

Sec	Description	Dev scale	Business Criticality	Usage by end user
7.1	project manager can de	7kstep	High	Medium
7.2	project manager can modif	1kstep	Low	High
7.3	project manager can modif	1kstep	Low	Low
7.4	Project mamanger monitors	1kstep	Medium	High

Step 1. Suppose  
70 % of whole dev scale  
belong to req 7.1.  
Business criticality is high  
& Usage by end user is  
medium  
7.1 is the main  
requirement in this  
project.



### Test case data (in Redmine)

TC	Description
tc1	Project manager should do
tc2	~
tc3	Administrator firstly
tc4	~
tc5	System manager
tc6	~

### <Option1 - test case coverage>

#### Testcase - Req mapping (CRESTA internal)

TC\Req	7.1	7.2	7.3	7.4
tc1	Y			Y
tc2			Y	Y
tc3	Y			Y
tc4		Y		Y
tc5	Y		Y	
tc6				

Step 2. By using LSA method, CRESTA  
identifys the corresponding testcases with  
the retrieved keywords from requirement  
description.  
This table is just like the traceability  
matrix, but please note this is basically  
not the actual workproduct of CRESTA

#### Coverage report (CRESTA board)

7.1 project manager ca	50%	= 3 / 6 testcases
7.2 project manager can m	16%	= 1 / 6 testcases
7.3 project manager can m	33%	= 2 / 6 testcases
7.4 Project mamanger moni	66%	= 4 / 6 testcases

Step 3. CRESTA shows the test case coverage report for  
each requiemtn section and highlights where more  
coverage is required.  
Considering the dev scale (70%), 50 % in tc numbers is lower  
than expected. It seems coverage is not sufficient.  
Expected figure will be based on Dev scale, Business Criticality &  
Usage by end user and should be manually given, before using  
CRESTA

To raise the percentage, use should add more testcases (tc7 -).

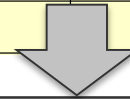


# UC3A, B: Measure adequacy & efficiency of test cases (試験項目の充足性・有効性の検証)

- 7.1. CRESTA should provide interface to setup users & roles.
- 7.2. CRESTA should provide four static roles(refer section 3.4 for actors list):
  - 7.2.1. Project Manager(PM)
  - 7.2.2. Test Lead(TL)
  - 7.2.3. CRESTA Admin(CA)
  - 7.2.4. Guest User(GU)
- 7.3. These 4 roles should be 'READ ONLY'. The Permissions of those CANNOT be modified (Edit/Remove) even by CRESTA Admin
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  - 7.4.2. Project manager should have permissions to configure UCL & LCL for various metrics
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  - 7.5.1. Test lead should have permissions to configure UCL & LCL for various metrics
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  - 7.6.2. CRESTA admin should have permissions to create new project

Test Cases

Test Case Reference ID	Test Scenario	Precondition	Test Case Description	Test Step	Test Case	Expected Results
1	User successfully predicts Defect Density Release Wise.	1.User has logged into the system with TL/PM Role and is on the home page. 2.CRESTA is connected to external defect repository Red mine	This is to verify that the TL user can predict using CRESTA as per the Prediction "Defect Density" and Trend "Release" selected	1	TL user goes to "Home" page to input prediction conditions.	On load of the Home page, system loads following data 1. Project dropdown with project list from the database <b>applicable (accessible) to logged in User</b> 2. Prediction Questions dropdown with prediction questions. 3. Trend Parameters dropdown is populated with either or both of the values "Release wise" and "Module wise" depending upon the prediction question selected.
				2	TL User selects project	Single project gets selected
				3	TL User selects "Defect Density" as prediction question	The prediction question "Defect Density" should get displayed
				4	TL User selects "Release" as trend parameter	The trend parameter "Release" should get displayed.



Requirements  
Specification doc

Test case Database

**Test Coverage**

[Quality Prediction](#)

[Test Optimization](#)

[Test Coverage](#)

[Adaptive Planning](#)

Project:

Module:

Requirement: 

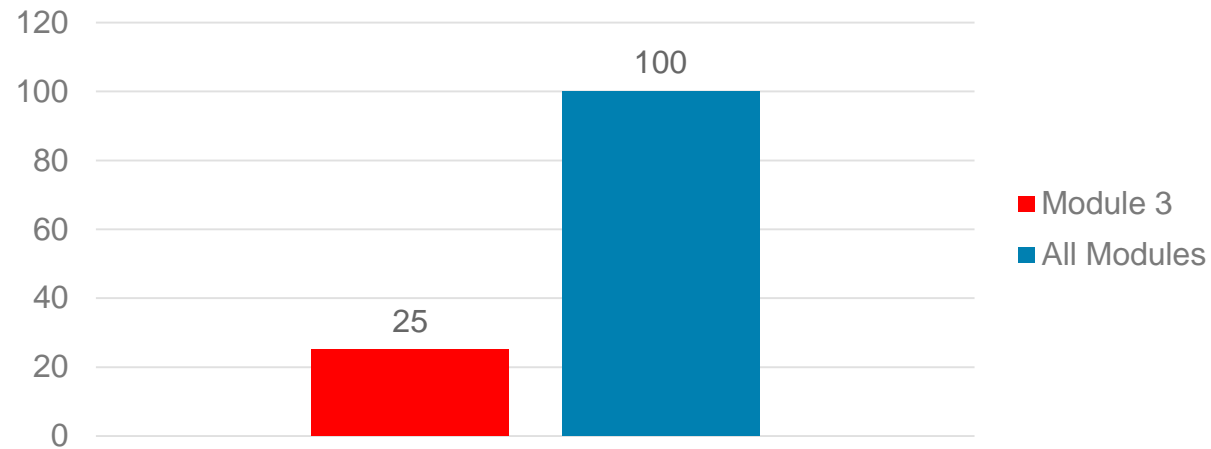
7. Project Manager  
 7.1. Project manager should have permissions to define metrics for a project  
 7.2. Project manager should have permissions to configure UCL & LCL for various metrics  
 7.3. Project manager should have permissions to monitor metrics & predictions given by CRESTA

Historical Data: ☐

User selects  
Historical data

# UC3A, B: Measure adequacy & efficiency of test cases

Defect Detection Efficiency  
(Historical Data)

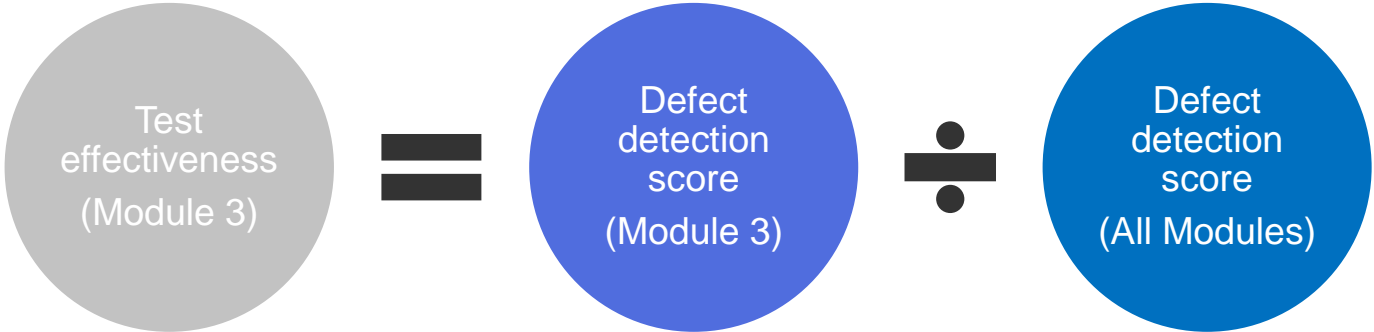
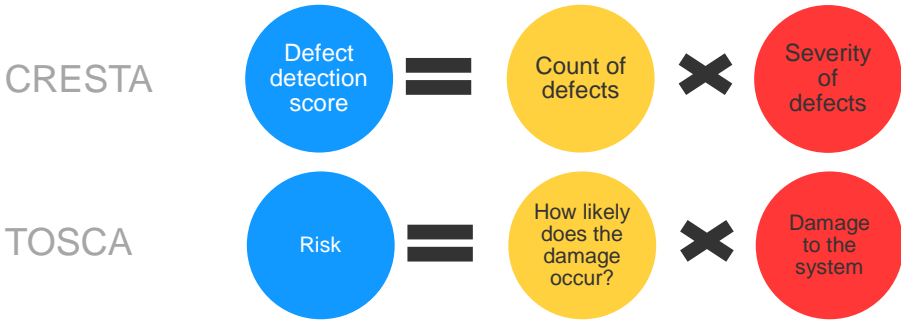


# UC3A, B: Analyse efficiency of test cases from historical data

Test Case ID	Test Scenario	Defect Detection score
TC0012	User successfully predicts Defect Density Release Wise.	31
TC0032	User ends up in error message when mandatory validation checks are not performed in home page	37

Historical  
Test execution data

Severity	Weight age
Minor	1
Major	2
Severe	3
Critical	4



# UC2: TEST OPTIMIZATION

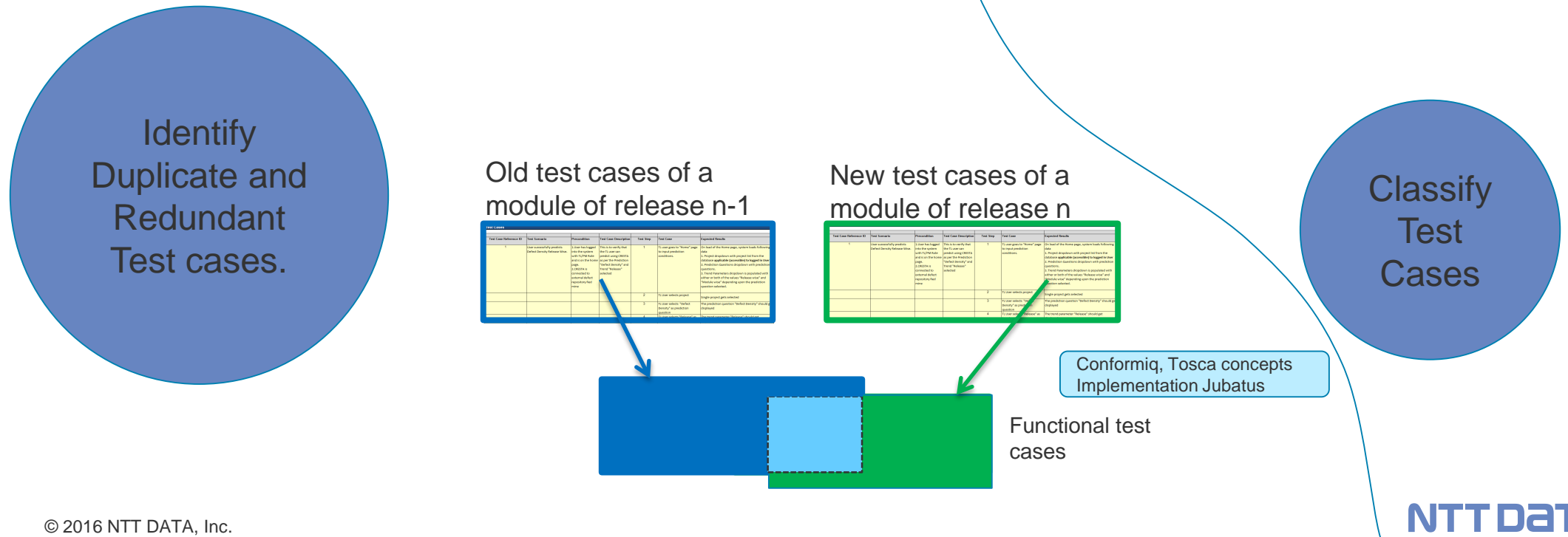
November, 2016

# UC2: Base Minimum Value Product Use Case. (MVP)

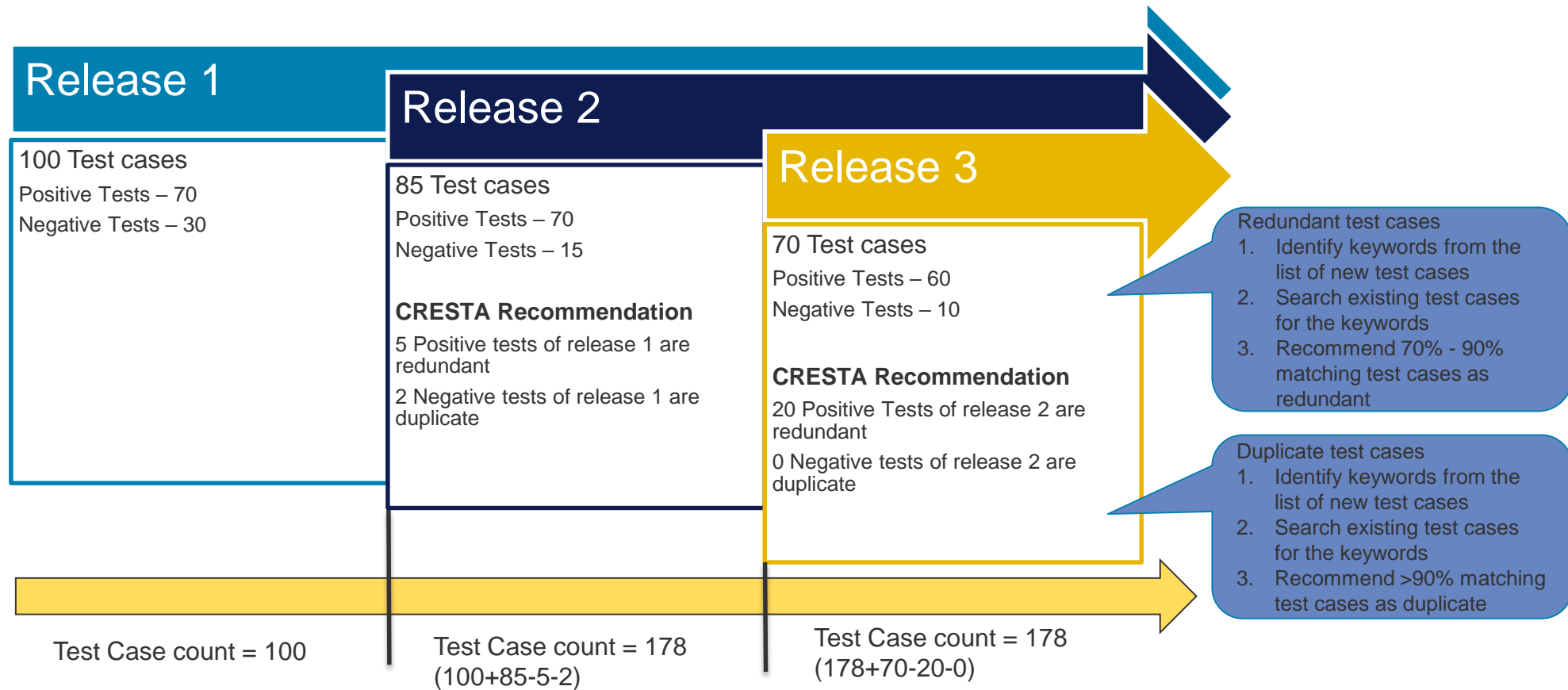
- (1) Select a project
- (2) Select the module under consideration

■ Result :

- (1) Classify Test cases and segregate the Test cases according to various categories.
- (2) Identify duplicate and redundant test cases.



# UC2: Identify testing overlaps



Before increasing test suite size, CRESTA will identify & recommend to eliminate duplicate & redundant test cases with the help of text analytics classification algorithms of machine learning  
Accomplished by comparing new test cases (current release n) with existing suite of test cases (up to previous release n-1)



# UC2A: Reduce duplicate testing efforts across teams (複数モジュール間の重複・冗長試験項目の特定)

Test Cases							Expected Results	
Test Case Reference ID	Test Scenario	Precondition	Test Case Description	Test Step	Test Case	Expected Results		
1	User successfully predicts Defect Density Release Wise.	1.User has logged into the system with TL/PM Role and is on the home page. 2.CRESTA is connected to external defect repository Red mine	This is to verify that the TL user can predict using CRESTA as per the Prediction "Defect Density" and Trend "Release" selected	1	TL user goes to "Home" page to input prediction conditions.	On load of the Home page, system loads following data 1. Project dropdown with project list from the database <b>applicable (accessible) to logged in User</b> 2. Prediction Questions dropdown with prediction questions. 3. Trend Parameters dropdown is populated with either or both of the values "Release wise" and "Module wise" depending upon the prediction question selected.	e" page	On load of the Home page, system loads following data 1. Project dropdown with project list from the database <b>applicable (accessible) to logged in User</b> 2. Prediction Questions dropdown with prediction questions. 3. Trend Parameters dropdown is populated with either or both of the values "Release wise" and "Module wise" depending upon the prediction question selected.
				2	TL User selects project	Single project gets selected	ct	Single project gets selected
				3	TL User selects "Defect Density" as prediction question	The prediction question "Defect Density" should get displayed	act n	The prediction question "Defect Density" should get displayed
				4	TL User selects "Release" as trend parameter	The trend parameter "Release" should get displayed.	ase" as	The trend parameter "Release" should get displayed.

Module 1 test cases

Module 3 test cases

[Quality Prediction](#)  
[Test Optimization](#)  
[Test Coverage](#)  
[Adaptive Planning](#)

Project: Project ABC

Module:

☒ Module 1
☐ Module 2
☒ Module 3
☐ Module 4

Optimization: Identify Testing Overlaps

Overlaps

Select more than one module

# UC2A: Reduce duplicate testing efforts across teams

Overlap between Module 1 & Module 3

## CRESTA

Comprehensive Robotic Engine for Software Test Acceleration

Project - ABC

Identify Testing Overlaps

Redundant test cases

▼ Module 1	▼ Module 3
TC0012	TC0045
TC0111	TC0123
TC0188	TC0356
TC0656	TC04412

Redundant test cases  
70% - 90% match.  
Some rework required  
on test cases.

Export

Duplicate test cases

▼ Module 1	▼ Module 3
TC0312	TC0041
TC0411	TC0143
TC0184	TC0326
TC0676	TC0422

Duplicate test cases  
>90% match. Test  
cases can be removed  
from test suite.

Export

# MVP: Classify and Segregate Test cases

## Test Cases

Test Case Reference ID	Test Scenario	Precondition	Test Case Description	Test Step	Test Case	Expected Results
1	User successfully predicts Defect Density Release Wise.	1.User has logged into the system with TL/PM Role and is on the home page. 2.CRESTA is connected to external defect repository Red mine	This is to verify that the TL user can predict using CRESTA as per the Prediction "Defect Density" and Trend "Release" selected	1	TL user goes to "Home" page to input prediction conditions.	On load of the Home page, system loads following data 1. Project dropdown with project list from the database <b>applicable (accessible) to logged in User</b> 2. Prediction Questions dropdown with prediction questions. 3. Trend Parameters dropdown is populated with either or both of the values "Release wise" and "Module wise" depending upon the prediction question selected.
				2	TL User selects project	Single project gets selected
				3	TL User selects "Defect Density" as prediction question	The prediction question "Defect Density" should get displayed
				4	TL User selects "Release" as trend parameter	The trend parameter "Release" should get displayed.

[Quality Prediction](#)  
[Test Optimization](#)  
[Test Coverage](#)  
[Adaptive Planning](#)

**Test Optimization**

Project:

Module: ☒ Module 1 ☐ Module 3  
☐ Module 2 ☐ Module 4

Optimization:

**Test Optimization**  
Project - ABC    Module - 1

☐ Automated  
☒ Test case Type  
☒ Scenario Type

Select the category

# MVP: Classify and Segregate Test cases

Each test case of the module is classified to selected categories

## CRESTA

Comprehensive Robotic Engine for Software Test Acceleration

Project - ABC    Module - 1

Classification & Segregation of test cases

Test case Type

▼ Functional	▼ Usability	▼ Performance	▼ DB
TC0012	TC0045	TC0155	TC0456
TC0111	TC0123	TC0589	TC0328
TC0188	TC0356	TC0845	TC0578
TC0656	TC0412	TC0725	TC0752

Export

Scenario Type

▼ Positive	▼ Negative
TC0312	TC0041
TC0411	TC0143
TC0184	TC0326
TC0676	TC0422

Export

Extract from Database

Machine Learning

# UC4: ADAPTIVE PLANNING

December, 2016

# UC4: Adaptive Planning

- Adaptive Planning Premise : This use case considers various Program parameters which can be altered to correct the course of the program.
  
- Use Case : The user inputs the following program data
  - a) Program Size(Person Months)
  - b) Timelines(Months)
  - c) Resources (Count)
  - d) Program Overheads \$)
  - e) Schedule Variance(Days)
  - f) Effort Variance(Days)
  
- CRESTA predicts approximate Budget required for the program, using historical data.



# UC4, 4A: Adaptive Planning

Historical Data

Program Size (Person Months)	Timelines (Months)	Resources (Count)	Program Overheads (\$)	Schedule Variance (Days)	Effort Variance (Days)	Program Budget (\$)
6	2	6	1000	1	0	250000
12	4	4	5000	0	5	500000
10	2.5	6	2500	5	5	500000
20	6	10	2500	5	5	800000
30	5	6	1000	2	0	900000

User can predict any one of the above parameters based on other parameters

[Quality Prediction](#)  
[Test Optimization](#)  
[Test Coverage](#)  
[Adaptive Planning](#)

Program:

ABC

Prediction:

Program Budget

Trend:

Month

Adaptive Planning

Note – Data shown above is indicative

# UC4, 4A: Adaptive Planning

[Back](#) [Home](#) [Logout](#)

## CRESTA

Comprehensive Robotic Engine for Software Test Acceleration

Program ABC

<b>Program Size</b> (Person Months)	<input type="text"/>	<b>Schedule Variance</b> (Days)	<input type="text"/>
<b>Timelines</b> (Months)	<input type="text"/>	<b>Effort Variance</b> (Days)	<input type="text"/>
<b>Resources</b> (Count)	<input type="text"/>	<b>Program Overheads</b> (\$)	<input type="text"/>

---

**Budget (\$)**

# UC4B: Adaptive Planning

Program ABC ▼

Analyse

	Quality Parameters			Project Parameters			Status	Weight age
	Defect Leakage	Defects deferred	Q3	Budget burnout (USD)	Schedule overrun (Days)	Project Size (Person Months)		
Project A	10	5		1K	2	20		75
Project B	5	0		0	0	10		15
Project C	2	1		0	0	5		10

Program ABC

# References

Document Name	URL
A Prediction Model for System Testing Defects using Regression Analysis	<a href="https://www.researchgate.net/profile/Suhaimi_Ibrahim/publication/259874862_A_Prediction_Model_for_System_Testing_Defects_using_Regression_Analysis/links/54f94b4b0cf210398e9805b9.pdf?origin=publication_detail">https://www.researchgate.net/profile/Suhaimi_Ibrahim/publication/259874862_A_Prediction_Model_for_System_Testing_Defects_using_Regression_Analysis/links/54f94b4b0cf210398e9805b9.pdf?origin=publication_detail</a>
Using In-Process Metrics to Predict Defect Density in Haskell Programs.pdf	<a href="https://www.cs.virginia.edu/~sherriff/papers/ISSRE-FA-SWV04.pdf">https://www.cs.virginia.edu/~sherriff/papers/ISSRE-FA-SWV04.pdf</a>
The Evolution of Analytics Opportunities and Challenges for Machine Learning in Business	<a href="http://www.sas.com/en_us/whitepapers/evolution-of-analytics-108240.html">http://www.sas.com/en_us/whitepapers/evolution-of-analytics-108240.html</a>
Regression Testing Minimisation, Selection and Prioritisation : A Survey	<a href="http://www0.cs.ucl.ac.uk/staff/M.Harman/stvr-shin-survey.pdf">http://www0.cs.ucl.ac.uk/staff/M.Harman/stvr-shin-survey.pdf</a>
Defect Density Measurement	<a href="http://www.ifpug.org/ISMA6/Thomas-Defect%20Density%20Measurement-Sept14.pdf">http://www.ifpug.org/ISMA6/Thomas-Defect%20Density%20Measurement-Sept14.pdf</a>
How AI Will Change Software Development And Applications	Forrester
Introducing Software Testing Author – Louise Tamres	Chapter 8: Reducing the number of test cases Section 8.4: Risk Analysis



# THANK YOU

# NTT Data

Global IT Innovator