

# NFM Ballistic Solution

## Overview

### Description

The document describes the specifications of the requirements and the proposed approach for the project aimed at changing the processes related to ordering and testing tests at the shooting range, as well as designing the ballistic system.

### Change justification

1. Speed, security (access and availability) and functionality of the current solution (Excel)
2. Increased efficiency through improvements such as structure search, etc.
3. Integration with IoT devices
4. Lack of transparent UX of the current solution
5. Possibility for future improvements like AI/machine learning

### Goal

Users have an intuitive system for creating test orders, performing tests, designing new ballistic systems and carrying out their tests (in the shortened path). Solution allows Power BI analysis of collected data from SQL DB.

## Testing Dashboard

### Description

App for conducting a **"Shooting test"**. Allows an operator to pick specific test order or start a development test.

### Requirements

#### 1. Testing Dashboard app

- 1.1. User can list all **"Shooting Order"** that are assigned to him along with their status.
- 1.2. Test results should be able to printout as PDF file.
- 1.3. User can start **"DS Test"**
- 1.4. User should be able to start a new **"Shooting test"** that is defined by following properties and arranged in steps
- 1.5. User can go back to **"Shooting Orders"** list
- 1.6. **"Test Compound"** must have special Test ID - Automatically generated from formula: Type.Today date.Counter (counter reset daily). Type options: TS for **"Shooting Test"**, DS for **"Development Shooting Test"**
- 1.7. User can add new **"Test Compound"** for tested **"Shooting Order"**
- 1.8. User can select to pick results from his previous **"Tests Compounds"**
- 1.9. Backing Type: searchable, combobox
- 1.10. Value of **"Tested Product"**, **"Ballistic System"** automatically taken from **"Shooting Order"**.
- 1.11. User can fill out **"Product Sample"** data S/N, Weight and size
- 1.12. For V50 test application will notify user as soon as V50 goal will be achieved
- 1.13. In **"Shot test"**, for each shot user can select calibration or proceeding shot?
- 1.14. User can search and pick up Ammo Type, Powder Type, Cartridge type
- 1.15. User can take a photos
- 1.16. User can choose and set **"Standard Details"**, pattern image, **"Test Action Type"**, **"Test Goal Type"** to new **"Development Shooting Test"**.
- 1.17. User can choose and set **"Tested Product"** and/or **"Ballistic System"** to new **"Development Shooting Test"**.

### Approach

PowerApps, Canvas

- Data Visualization
- Custom UI and UX design
- V50 calculation Logic
- Connectors with CDS and SharePoint

CDS

- Database

Microsoft Flow:

Name	Category	Description
Get Test Photo From SP	integration	Get Photo from SharePoint for selected <b>"Test Compound"</b>
Relate Test Order with ICW	Workaround/integration	Relate selected <b>"Shooting Order"</b> with selected <b>"ICW"</b> . Use for create relation for serial update solution
Save Test Photos to SP	Integration	Create folder in SharePoint library and save Tests Photos in this folder. Use for keep photos original size and quality

Relate Test Compound to Test Action	Workaround/Integration	Relate selected <b>“Test Compound”</b> with <b>“Tests Action”</b> . Use for create relation for serial update solution
Relate Development Test Order with Product	Workaround/Integration	Relate selected <b>“Shooting Order”</b> with selected <b>“Product”</b> . Use for create relation for serial solution
Update Development Test Order Status	Workaround/Integration	Update <b>“Shooting Order”</b> status
Relate Samples And Test Compound	Workaround/Integration	Relate selected <b>“Test Compound”</b> with <b>“Samples”</b> . Use for create relation for serial solution
Create Tested Standard Detail and Relate Test Order with Standard Details	Workaround/Integration	Create new records in NBS Tested Standard Details Entity. Relate selected <b>“Shooting Order”</b> with <b>“Standards Details”</b> . Use for create records and relation for serial solution
Relate Test Compound to tested Standard Details	Workaround/Integration	Relate selected <b>“Test Compound”</b> with NBS Tested Standard Details Entity. Use for create relation for serial solution
Send to Test Dashboard App	Integration	Send <b>“Shooting Order”</b> data from SharePoint list to CDS
Move to Testing Dashboard app	Integration	Automated create record in NBS Test Order record getting data from NBS R&D Order View Entity

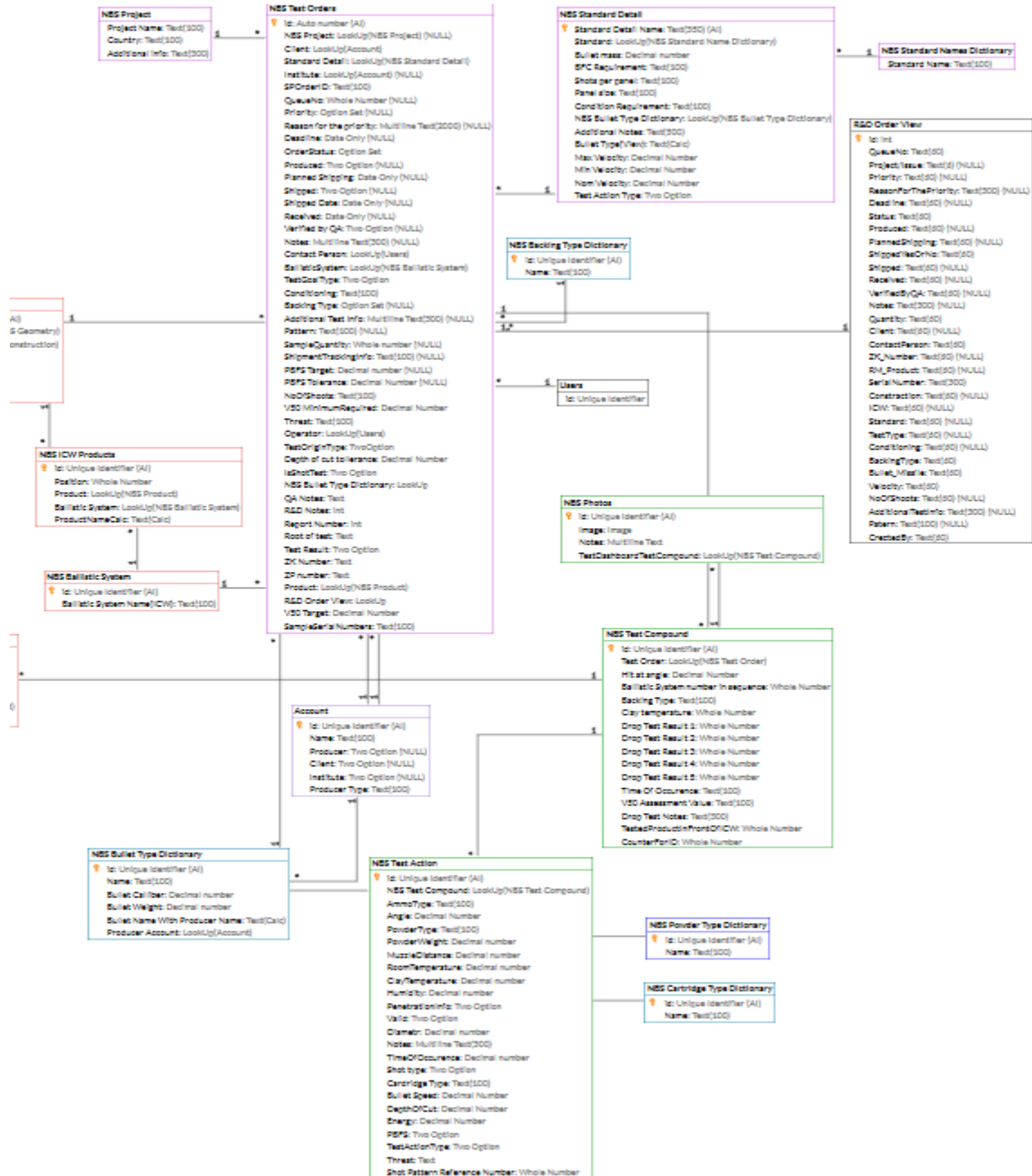
## Dictionary

Word/Phrase	Meaning	Synonyms
Construction	It's compound of multiple <b>“Material stacks”</b> and/or <b>“Material”</b> in specific order and <b>“Stitching”</b>	Composite, Solution
Product	It is a <b>“Construction”</b> with a specific geometry	Component of the System
Product <b>Sample</b>	It is a copy of the specific <b>“Product”</b> in specific <b>“Geometry”</b> with actual values for thickness, weight, size, serial number	Sample
<b>Tested Product</b>	<b>“Product”</b> that will be tested	
<b>Ballistic System</b>	<b>“Product”</b> or set of <b>“Products”</b> that will be tested with <b>“Tested Product”</b>	ICW, In Conjunction With, Panel, Soft ballistic
Standard	Name which includes different <b>“Standard Details”</b>	
Standard Detail	Individual requirements for <b>“Shooting test”</b>	
<b>Ammo Type</b>	-	Bullet type
Shot Test	Specific steps in specific order due to check if a <b>“Ballistic System”</b>	Ballistic test, Shooting Test

	can stand shooting according to a standard	
Stab Test	Specific steps in specific order due to check if a <b>“Ballistic System”</b> system can stand stabs according to a standard	
<b>Development Shooting Test</b>	Test started without an <b>“Shooting Order”</b> (mainly for development purposes). It implies shorter test path	Non ordered Test, DS, DS Test
Test Goal Type	V50 or P-BFS	
Shooting Test	<b>“Tests Compound”</b> collection for selected <b>“Shooting Order”</b>	TS test, Ordered Test, TS
Test Compound	Test perform for one <b>“Panel”</b> , include information from drop test, relate with few <b>“Tests Action”</b> , selected <b>“Shooting Order”</b> , <b>“Tested Product”</b> and/or <b>“ICW”</b>	
Test Action	Test performed for one shot or stab	Test Proceedment
Shooting Order	Request of a <b>“Shooting test”</b> for the specific <b>“Product”</b>	Test Order
Shooting Order App	App to request a <b>“Shooting Test”</b> for the specific <b>“Product”</b> . Such test may be described with multiple properties i.e. client, project, custom standard detail etc	
Testing Dashboard App	App for conducting a <b>“Shooting test”</b>	
Construction Creator App	App for creating ballistic constructions	

## Architecture

Project database diagram <https://dbdesign.online/model/3TJ612sF5wXE>



## CDS Entities Description

NBS Test Order			
Display name	Data type	Required	Additional notes
Additional Test Info	Multiline Text(300)		

Backing Type	Lookup		NBS Backing Type Dictionary
Ballistic System	Lookup		NBS Ballistic System
Client	Lookup		Account
Conditioning	Text(100)		
Contact Person	Lookup		Users
Deadline	Date Only		
Depth Of Cut Tolerance	Decimal Number		
Institute	Lookup		Account
IsShotTest	Two Option		True: Shot, False: Stab
NBS Bullet Type Dictionary	Lookup		NBS Bullet Type Dictionary
No of Shoots	Text(100)		
Notes	Multiline Text(300)		
Operator	Lookup		Users
Order Name	Text(100)		Primary Field
Order Status	Option Set		
Pattern	URL		
PBFS - Target	Decimal Number		
PBFS - Tolerance	Decimal Number		
Planned Shipping	Date Only		
Priority	Option Set		
Produced	Two Option		
NBS Project	Lookup		NBS Project
QA notes	Text		
Queue No	Whole Number		
R&D Notes	Text		
R&D Order View	Lookup		
Reason for the priority	Multiline Text		
Received	Date Only		
Report number	Text		
Root of test	Text		
Sample Quantity	Whole Number		
Sample Serial Numbers	Text		
Shipment Tracking Info	Text		
Shipped	Two Option		
Shipped Date	Date Only		
SP Order ID	Text		
Standard Detail	Lookup		NBS Standard Detail
Standard Detail Picker	Text		
NBS Product	Lookup		NBS Products
Test Goal Type	Two Options		True: V50, false: P-BFS
Test Origin Type	Two Options		True: TS, false: DS
Test Result	Two Options		
Threat	Text		
V50 Minimum Required	Decimal Number		
V50 Target	Decimal Number		
Verified by QA	Two Options		
ZK number	Lookup		NBS ZK Number Dictionary
ZP number	Text		

NBS Test Compound			
Display name	Data type	Required	Additional notes

Backing Type	Text		
Ballistic System Number in Sequence	Text		
Clay Temperature	Whole number		
Counter For Id	Whole number	Yes	
Drop Test Notes	Multiline Text		
Drop Test Result 1	Whole number		
Drop Test Result 2	Whole number		
Drop Test Result 3	Whole number		
Drop Test Result 4	Whole number		
Drop Test Result 5	Whole number		
Hit at angle	Whole number		
Id	Text	Yes	Primary Field
Tested Product in Front of ICW	Whole Number		
Test Order	Lookup		NBS Test Order
Time of Occurrence	Date and Time		
V50 Assessment Value	Decimal Number		

NBS Test Action			
Display name	Data type	Required	Additional notes
Ammo Type	Text		
Angle	Decimal Number		
Bullet Speed	Decimal Number		
Cartridge Type	Text		
Clay Temperature	Decimal Number		
Depth Of Cut	Decimal Number		
Diameter	Decimal Number		
Energy	Decimal Number		
Humidity	Decimal Number		
Id	Unique Identifier	Yes	Primary Field
Muzzle Distance	Decimal Number		
Notes	Multiline Text		
P-BFS	Two Option		True: V50, False: PBFS
Penetration Info	Two Option		True: PP, False: CP
Powder Type	Text		
Powder Weight	Decimal Number		
Room Temperature	Decimal Number		
Shot Pattern Reference Number	Whole Number		
Shot type	Two Option		
Test Action Type	Two Option		True: Shot test, False: Stab test
NBS Test Compound	Lookup		NBS Test Compound
Threat	Text		
Time of Occurrence	Decimal Number		
Valid	Two Option		True: valid, False: invalid

NBS Product			
Display name	Data type	Required	Additional notes
Geometry (View)	Text		Calculation field

Position	Whole Number		
Product Code	Text		
Construction	Lookup		NBS Construction
Product Name	Text	Yes	Primary Field
NBS Geometries	Lookup		NBS Geometry
ZK Number	Text		

NBS Standard Detail			
Display name	Data type	Required	Additional notes
Additional Notes	Text		
NBS Bullet Type Dictionary	Lookup		NBS Bullet Type Dictionary
Bullet mass	Decimal Number		
Bullet Type (View)	Text		Calculation field
Level of Protection	Text		
Max Velocity	Decimal Number		
Min Velocity	Decimal Number		
Nom Velocity	Decimal Number		
BFS Requirement	Text		
Condition Requirement	Text		
Panel size	Text		
Shots per panel	Whole Number		
Standard	Lookup		NBS Standard Names Dictionary
Standard Detail Name	Text		Primary Field, Calculation
Test Action Type	Two Option		True: shot, False: stab

NBS Sample			
Display name	Data type	Required	Additional notes
id	Autonumber	Yes	Primary Field
Product	Lookup		NBS Product
Serial number	Text		
Test Compound	Lookup		NBS Test Compound
Thickness	Decimal Number		
Weight	Decimal Number		

NBS ICW Product			
Display name	Data type	Required	Additional notes
Id	Autonumber		Primary Field
BallisticSystem	Lookup		NBS Ballistic System
Product	Lookup		NBS Product
Product Name Calc	Text		Calculation field
Position	Whole Number		

NBS Ballistic System			
Display name	Data type	Required	Additional notes
Ballistic System Name(ICW)	Text	Yes	Primary Field

NBS Standard Name Dictionary			
Display name	Data type	Required	Additional notes



Standard name	Text	Yes	Primary Field
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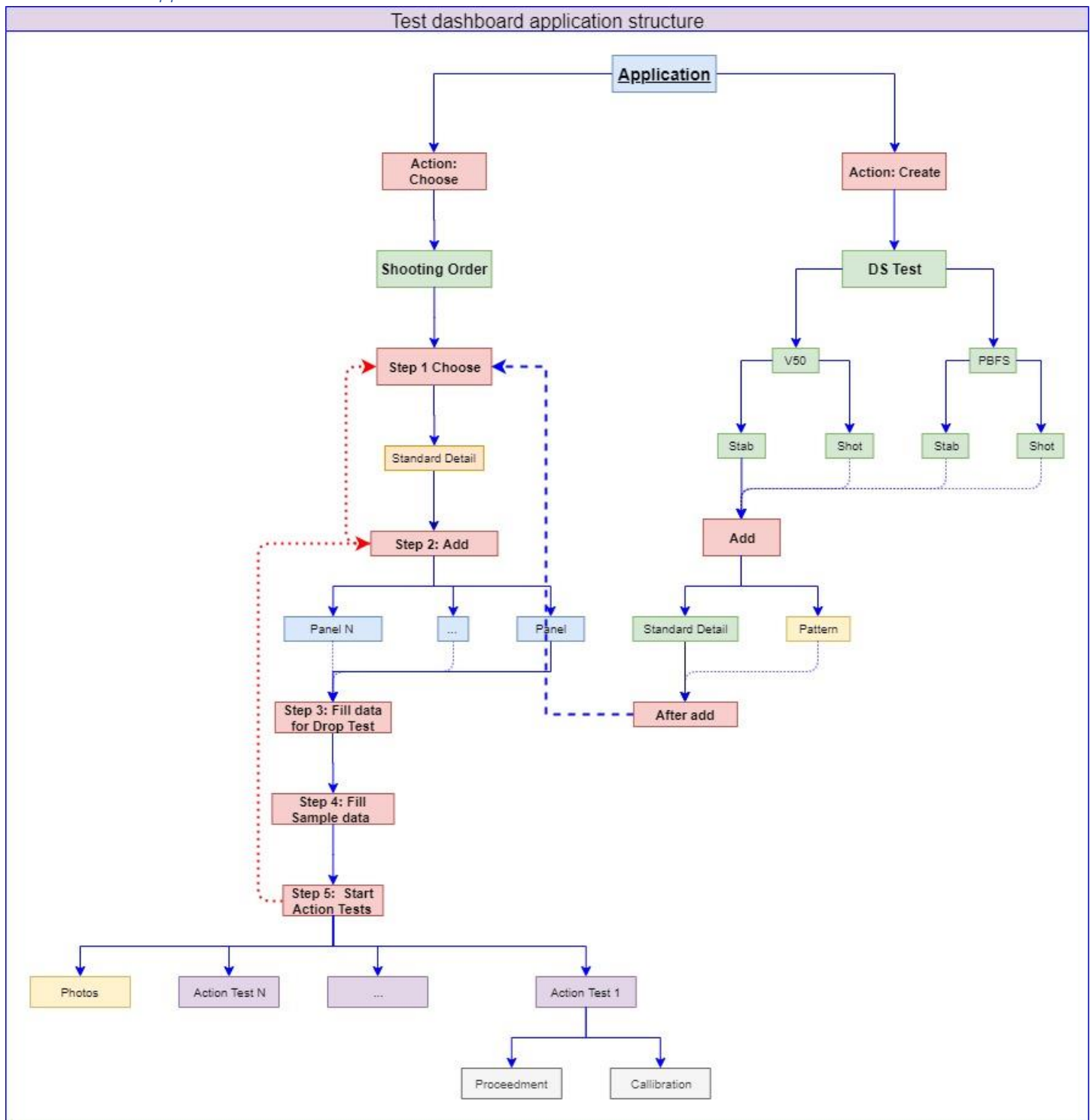
NBS Photo			
Display name	Data type	Required	Additional notes
Id	Text	Yes	Primary Field
Image	Image		Not use
Notes	Text Area		
Test Dashboard Test Compound	Lookup		NBS Test Compound

NBS Geometry			
Display name	Data type	Required	Additional notes
Description	Multiline Text		
Name	Text	Yes	Primary Field

NBS Bullet Type Dictionary			
Display name	Data type	Required	Additional notes
Name	Text	Yes	Primary Field
Bullet Caliber	Decimal Number		
Bullet Name With Producer Name	Text		Calculation field
Bullet Weight	Decimal Number		
Producer Account	Lookup		Account

NBS Powder Type Dictionary			
Display name	Data type	Required	Additional notes
Name	Text	Yes	Primary Field

NBS Cartridge Type Dictionary			
Display name	Data type	Required	Additional notes
Name	Text	Yes	Primary Field




### Components

1. Step component.






Requirements 1.4.

2. "Shooting Order" info component.



# Panels

Received Ski, not shot

Test type	TS/P-BFS/Stab Test	PBFS-Tolerance	678	Sample serial No	1223234454, 4665546546, 6554754754, 654757734
Ballistic System	S/A	PBFS-Target	786	Samples quantity	4
Bullet type	.40 S&W FMJ RN	No of shots	6	Test Notes	Pellentesque id nibh tortor id aliquet lectus proin nibh. Dictum fusce ut placerat orci nulla pellentesque.


Standard Details

Origin Standard	NIJ 0101.04-II-A-.40 S&W FMJ RN	Nom Velocity (m/s)	322	Condition requirement	All armor panels (including carriers) must be sprayed for 3 minutes on both sides before test starts Armors must be sized to fit a 117-122 cm chest circumference for males and 107-112 cm for females
Level of Protection	II-A	Min Velocity (m/s)	313	Panel Size	
BFS Requirement	44 mm	Max Velocity (m/s)	331		
Bullet Type	.40 S&W FMJ RN	Bullet mass (g)	11.7	Shots/Panel	



Optional. On each step User can see the selected "Shooting Order" and "Standard Detail" details.

## Screens

1. Screen 1: Test Dashboard



# Tests Dashboard

● V50 ● P-BFS

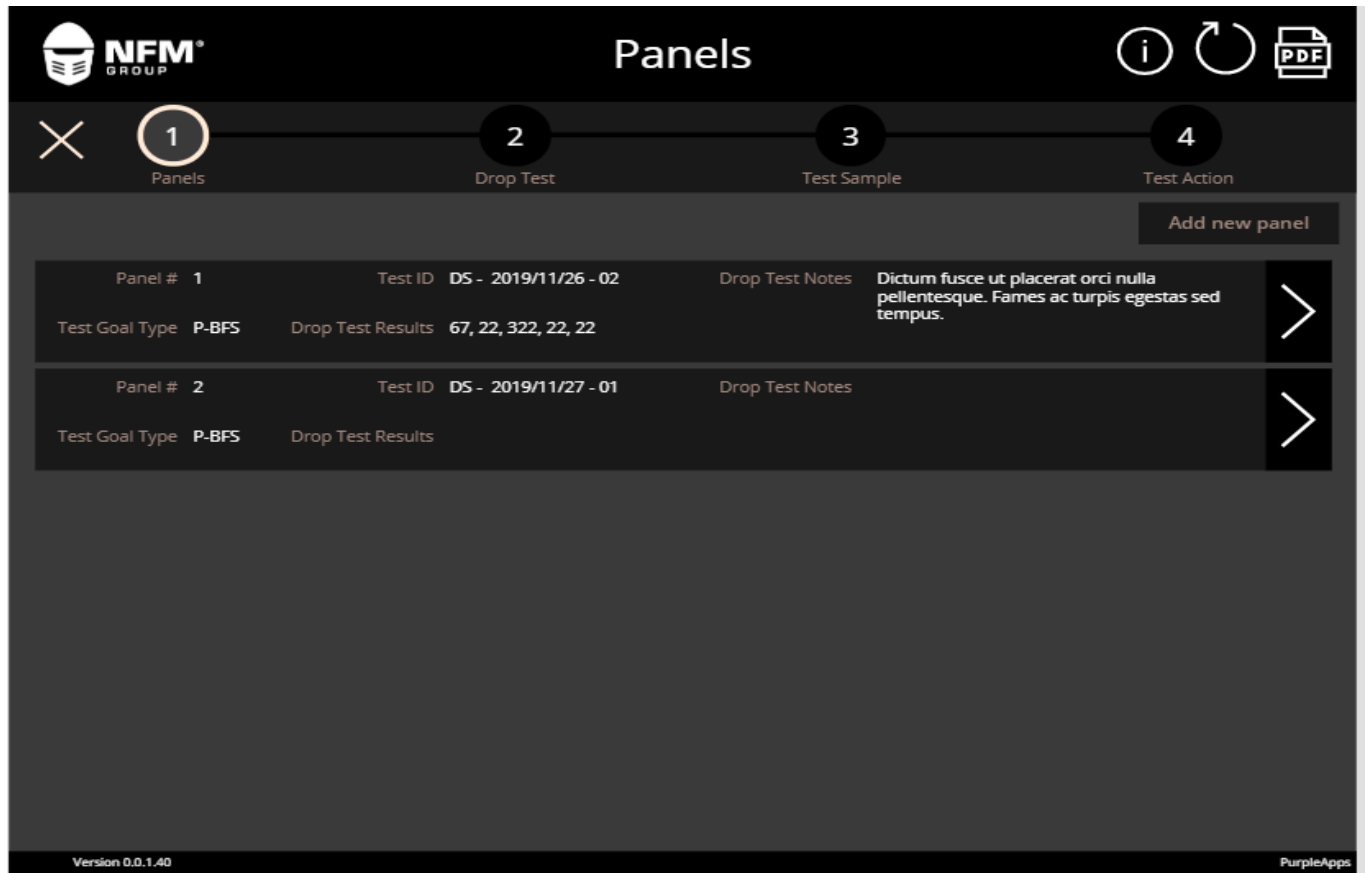
Received Ski, not shot	RM/Product	Backing Type	Test Type	ICW	ZK Number	Standard
		Roma No 1	V50			NIJ 0101.04-II-A-9 mm FMJ RN
Received Ski, not shot	RM/Product	Backing Type	Test Type	ICW	ZK Number	Standard
22	29/11/2019	TOR X3M v100	HOSDB 2007 Foam package	P-BFS S/A	ZK012345987667 8	NIJ 0101.04-II-A-.40 S&W FMJ RN
Received Ski, not shot	RM/Product	Backing Type	Test Type	ICW	ZK Number	Standard
		Herbin Souer 40	V50			
Received Ski, not shot	RM/Product	Backing Type	Test Type	ICW	ZK Number	Standard
		PE31	Herbin Souer 40	V50		NIJ 0101.04-I-.380 ACP FMJ RN
Received Ski, not shot	RM/Product	Backing Type	Test Type	ICW	ZK Number	Standard
		PE100	Herbin Souer 40	P-BFS TOR X3M v1 + PE31		NIJ 0101.04-I-.22 caliber LR LRN
Received Ski, not shot	RM/Product	Backing Type	Test Type	ICW	ZK Number	Standard
			P-BFS			

Version 0.0.1.40

PurpleApps

Requirements: 1.1., 1.3., 1.4.

## 2. Screen2. Panels



Requirements: 1.7., 1.6, 1.2., 1.8., 1.9.

### 3. Screen 3. Drop Test

**NFM GROUP** **Drop Test** [Info] [Refresh] [PDF]

1 Panels 2 **Drop Test** 3 Test Sample 4 Test Action [Save]

Backing Type	Clay Temp	Drop Test Result
Roma No 1	90	67, 22, 322, 22, 22
Roma No 1	90	67, 22, 322, 22, 22
Roma No 1	90	67, 22, 322, 22, 22
Roma No 1	90	67, 22, 322, 22, 22
Roma No 1	89	67, 22, 322, 22, 22

\* Test Id: DS - 2019/11/26 - 02

Backing Type: Roma No 1 (dropdown)

Clay Temperature: 90

Drop Test Result 1: 67

Drop Test Result 2: 22

Drop Test Result 3: 322

Drop Test Result 4: 22

Drop Test Result 5: 22

Additional Notes Drop Test: Dictum fusce ut placerat orci nulla pellentesque. Fames ac turpis egestas sed tempus.

Version 0.0.1.40 PurpleApps

Requirements: 1.6, 1.2., 1.10., 1.11.

### 4. Screen 4. Ballistic System

**NFM GROUP** **Ballistic System** [Info] [Refresh] [PDF]

1 Panels 2 Drop Test 3 **Test Sample** 4 Test Action [Save]

Test ID: DS - 2019/11/26 - 02

Ballistic System: test Ballistic system24

Product	Geometry	Serial No	Thickness	Weight
PE01		Enter sample serial number	Enter thickness mm	Enter weight g
PE100		Enter sample serial number	Enter thickness mm	Enter weight g
PE31		Enter sample serial number	Enter thickness mm	Enter weight g
TOR X3M v100		Enter sample serial number	Enter thickness mm	Enter weight g

Version 0.0.1.40 PurpleApps

Requirements: 1.6, 1.2., 1.12., 1.13., 1.19.

5. Screen 5. Test Action

**NFM GROUP** Test Action

1 Panels 2 Drop Test 3 Test Sample 4 Test Action

Stanag 2920 ed.3 V50 Assessment: 37.17

Photos Add new shot

# ☐ Test procedement Add. Notes

Pre-test checklist

M2AP: N140 23 ° (Room)

7,62 X 63 10 grains 20 ° (Clay)

0 2 m 60

Post-test checklist

30 m/s Velocity 30 m/s

Valid

PP

# ☐ Test procedement Add. Notes

Pre-test checklist

M2AP: N140 23 ° (Room)

7,62 X 63 0 grains 20 ° (Clay)

0 2 m 60

Post-test checklist

40 m/s Velocity 40 m/s

Valid

PP

# ☐ Test procedement Add. Notes

Pre-test checklist

Post-test checklist

Version 0.0.1.40 PurpleApps

Requirements: 1.6, 1.2., 1.14., 1.15., 1.16.

6. Screen 6: Take Image

**NFM GROUP** Take Image

Damage Photo 1 Damage Photo 2

Version 0.0.1.40 PurpleApps

Requirements: 1.17.

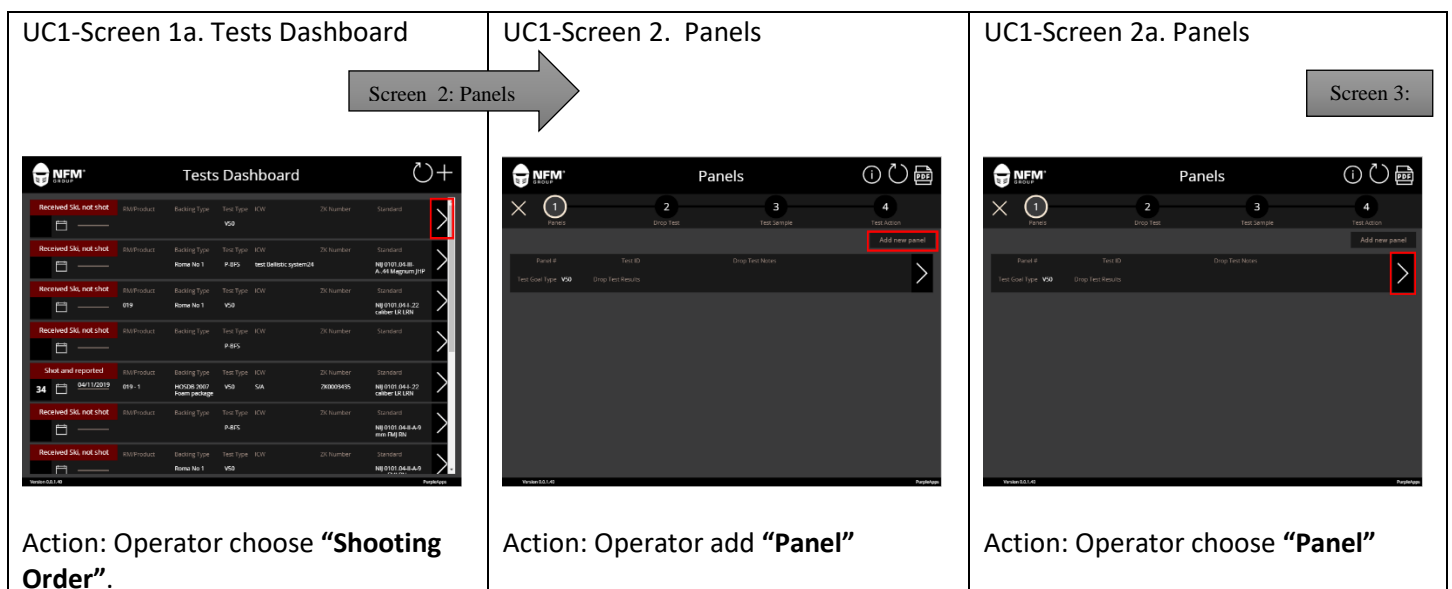
## 7. Screen 7: Development Test



Requirements: 1.18.

## Use Cases

UC 1: Operator choose existing "Shooting Order" from the Shooting Orders list and perform "Shooting test"



## UC1-Screen 3a. Drop Test

Action: Operator fill the data for **“Test Compound”**

## UC1-Screen 3b. Drop Test

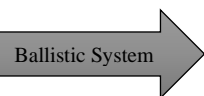
Action: optionally the operator can copy the data of one from 5 last **“Tests Compound”**

## UC1-Screen 3c. Drop Test

Screen 4:

Action: Operator have to save the data

## UC1-Screen 4a Ballistic System

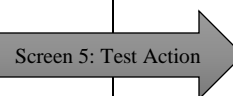


Action: Operator fill **“Sample”** data for selected **“Tested Product”** or for **“ICW” “Samples”** (if any defined in the order)

## UC1-Screen 4b Ballistic System

Action: Operator have to save the data

## UC1-Screen 5a Test Action



Action: Operator add new **“Test Action”**

## UC1-Screen 5b Test Action

Action: Operator full the **“Test Action”** data.

## UC1-Screen 5c Test Action

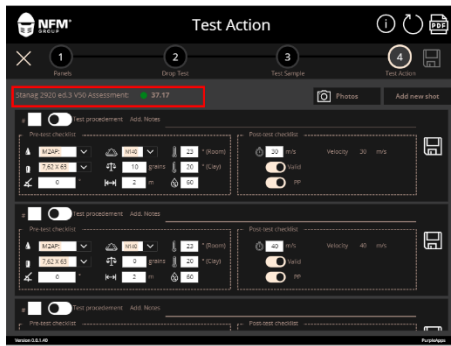
Action: Operator can save each **“Test Action”** separately

## UC1-Screen 5d Test Action

Action: In case of add next **“Test Action”** data(Bullet type, Cartridge type, Powder type, Distance, Room and Clay temp, Humidity) have automatically copied from first **“Test Action”**

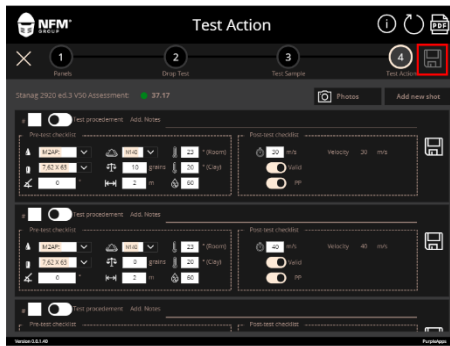


### UC1-Screen 5e Test Action



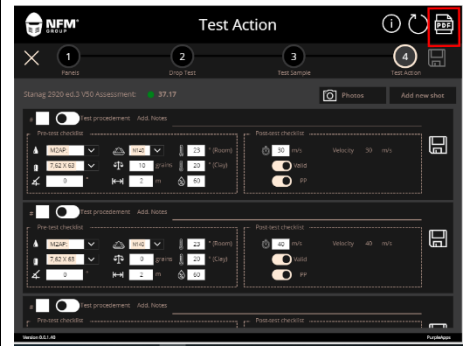
Action: In case of **“V50 Test Action”** red indicator has changed to green, when achieve V50 conditions

### UC1-Screen 5f Test Action



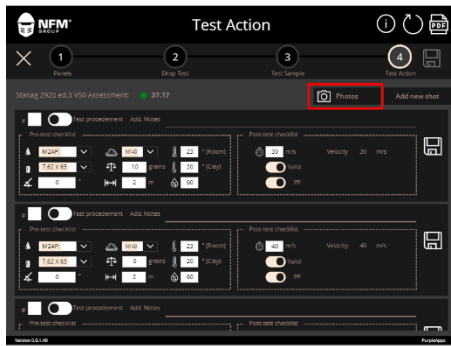
Action: Optionally operator can save all **“Tests Actions”**

### UC1-Screen 5g Test Action



Action: Operator can send Test report to e-mail in PDF format

### UC1-Screen 5h Test Action



Action: Navigate to Screen 6a Take Image

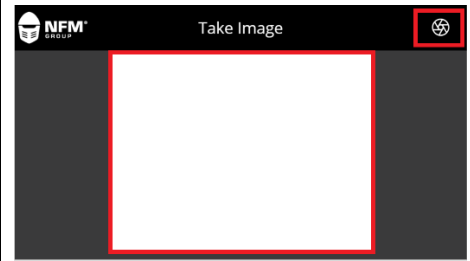
Screen 6: Take Image

### UC1-Screen 6a Take Image



Action: Turn on camera

### UC1-Screen 6b Take Image



Action: Operator can take Image

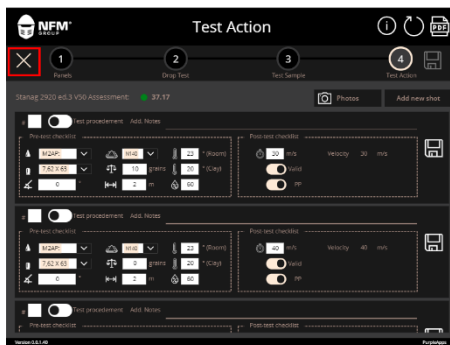
### UC1-Screen 6c Take Image



Action: Operator return to **“Test Action”** screen

Screen 5: Test Action

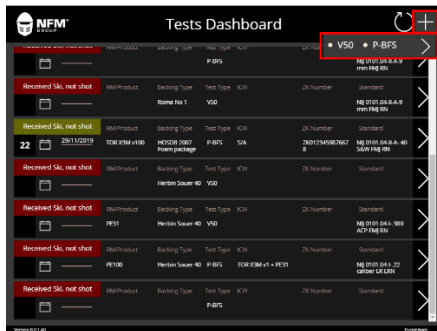
### UC1-Screen 5k Test Action



Action: Return to Screen 1a. Tests Dashboard

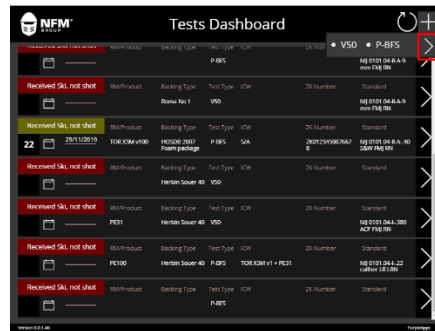
## UC 2: Operator create a “Development Shooting Test”

### UC2-Screen 1b. Tests Dashboard



Action: Operator choose **“Test Goal Type”**

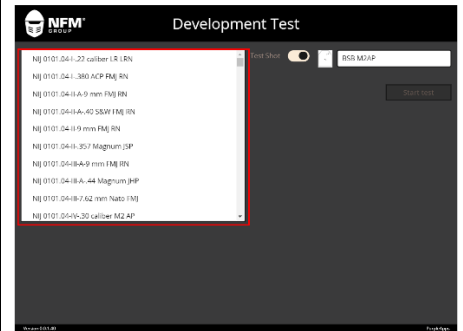
### UC2-Screen 1c. Test Dashboard



Action: Create **“Development Shooting Test”**

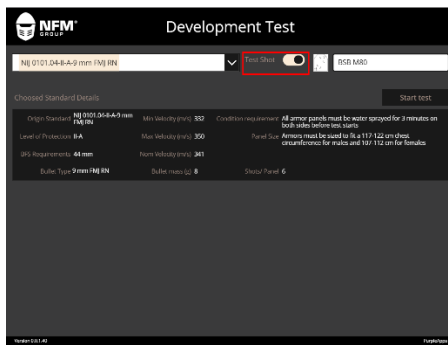
### UC2-Screen 7a. Development Test

Screen 7: Development Test



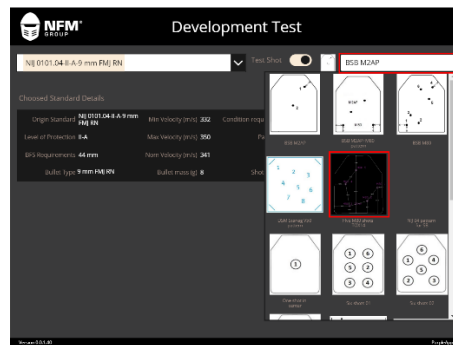
Action: Operator choose **“Standard Detail”**

### UC2-Screen 7b. Development Test



Action: Operator select **“Test Action Type”**. Default value: **“Test Shot”**

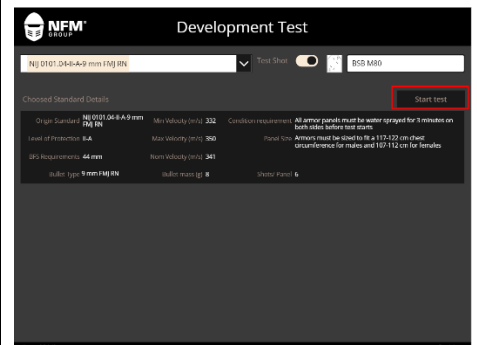
### UC2-Screen 7c. Development Test



Action: Operator choose Pattern

### UC2-Screen 7d. Development Test

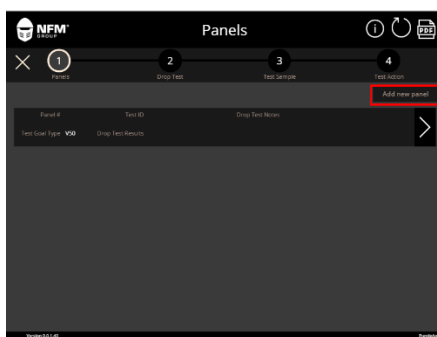
Screen 2:



Action: Operator start **“Development Shooting Test”**.

### UC1-Screen 2. Panels

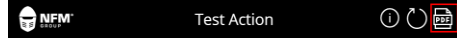
Panels



Action: Operator add **“Panel”**

*UC3: Operator generate and send Report.*

UC3-Screen 2, Screen 3, Screen 4,  
Screen 5



Action: Operator can generate report with all test result

UC3

Action: Go to MS Office Outlook

UC2-Screen 9 Rapport

**Test**

Run this test against the following URL:

**Kyle Smith**  
k.smith@mycorp.com  
MYCORP-TESTING-001

Run on: 10/10/2023 12:30 PM UTC

---

### TEST ORDER INFO

Test Order ID	0000001-test-456-1234567890123456789
Client	
Contacting	
Addressed Test Info	
Included	
Contact Person Email	john.doe@mycorp.com
Generate Email	www.mycorp.com/en-us
Priority	Normal
Reason for the priority	
Project	
Product	WEB [Code: WEB]
URL	N/A
VED test	Yes
Ordered test	No

Action: Navigate to Screen 3: Panels.