Introduction

Welcome to Project Armory's Developer Manual in this little manual you will find information on guidelines and how to create a weapon, bullets and other mod related material.

We also want to present you to our mascot; Wheatles.

Bug Tracker

AS a developer you need an account on the mods bug tracker. Make a user with the same name that you use on the forum.
http://projectarmory.se/mantis/
Evul will make sure you get the proper permissions. As soon as the account is created.

Tasks assigned to you are located under My View under the topic Assigned to Me (Unresolved)

Color description

- New (Red) means that it is a new task recently added.
- Acknowledged (Orange) means that it's an up for grabs task for any developer No texture and no XML file is made.
- Confirmed (Yellow) means that someone have been worked on but requires something and/or should be made; a confirm feature.
- Assigned (Blue) someone is currently working on the task.

When a task is made close it, bugs are resolved.
Never close a task until both a XML and a Texture exist if you are only a code developer or art developer set the task to confirmed and upload the texture or add a note to the task. You can also set task to the feedback status.

SVN Server

First create a directory inside of RimWorld mods directory named: ProjectArmoryDev

Download: TortoiseSVN

Install it and right click the "ProjectArmoryDev" folder and press "SVN Checkout" (If it does not exist restart the computer.)

Enter flowing server: https://padev.svn.cloudforge.com/pa
When asked for user name and password enter the one provided by Cloud Forge (check your mail.) It will then start to download the entire mod.

Now go to "...\ProjectArmoryDev\xDev" and create a folder named ![YOURNAME].

The go back to the mods folder and right click "ProjectArmoryDev" and press "SVN Commit..." and commit the new changes made (The directory you just made).

Before working on something new make sure to right click and press "SVN Update" on the "ProjectArmoryDev" directory so you have a up to date work copy.

MAKE A NEW WEAPON

You want to make a weapon to the mod. How do i do this? Well this chapter tells you how to and what you should do when making one.

NOTE:

If you are an art developer you only need to do stage 1 and 2. If you are a programmer and don't handle art you can skip stage 2 and jump to stage 3.

1. MANTIS

The format of a new mantis task follows this:

Mantis Naming format:

```
New Weapon: [M/G] WeaponName
```

New Weapon	The name start indicates that it is a new weapon.
M/G	This tag declares if it is a game or movie weapon. Skip it if it isn't a movie or game weapon.
WeaponName	The weapon name the weapon name should not contain any symbols and no spaces. The name should be dragged together and use only Letters and numbers.

Examples of the format:

```
New Weapon: FN P90
New Weapon: [Star Wars] E-11 Blaster
```

2. WEAPON ART

Make a picture resembling the weapon. Don't sacrifice the length to get the center ok, instead make the weapon smaller. We want to avoid compact cartoony weapons.

Art Examples:

If a variant of the weapon already exist you need to update the already existing variant or keep the format and draw a variant as close to the other weapons format as possible.

Variant Art Examples:

If you don't have a texture for the weapon you can use the Project Armory Weapon Case placeholder. It is located in the **xDev** directory named **#Gun_Placeholder.png**

Art Naming format:

NoXMLTag_WeaponType_WeaponClass_WeaponName.png

NoXMLTag Is **ONLY** used when there is no xml file for the weapon. You add this to the name: NoXML_

WeaponType This tag just say that it is a gun texture

Class	Name
Gun	This indicated that it is a gun and not a bow or throw able.
Melee	Melee weapon this also involves bows and towable weapons.

WeaponClass The Weapon Class Tag is used to classify the weapon.

Class	Name
AR	Assault Rifle
ESR	Energy Rifle
HMG	Heavy Machine Gun
HSMG	Heavy SubMachine Gun
L	Launcher
LMG	Light Machine Gun
P	Pistol
R	Rifle
S	Shotgun
SMG	Submachine gun
SR	Sniper Rifle

WeaponName The weapon name the weapon name should not contain any symbols and no spaces. The name should be dragged together and use only Letters and numbers.

All texture files should be located: **\Textures\Things\Item**

3. RESEARCH

Research the weapon; what is the weapon class (See Stage 4 **Make the XML: WeaponClass** on Pg.3.), what is the rate of fire, what is the caliber, does the variant you making have a specific name and all kinds of interesting things about the weapon.

4. MAKE THE XML

When making the XML you could always copy past an already finished weapon.

XML naming format:

PA_WorldTag_WeaponClass_WeaponName.xml

PA The PA tag is used to make sure all the PA weapons are shorted together. But it is also used to make the Project Armory Weapons more unique.

WorldTag The World tag is used were the weapon appear or is used.
Following tags are available:

```
AmericanCivilWar
Flintlock
Medieval
Modern
Prewar
Prohibition
Renaissance
SciFi-X (Example: PA_SciFi-StarWars_EP_E11Blaster)
Tribal
Vanilla (A vanilla weapon modification.)
```

WorldWar1
WorldWar2

WeaponClass The Weapon Class Tag is used to classify the weapon.

Class	Name
AR	Assault Rifle
ESR	Energy Rifle
HMG	Heavy Machine Gun
HSMG	Heavy SubMachine Gun
L	Launcher
LMG	Light Machine Gun
P	Pistol
R	Rifle
S	Shotgun
SMG	Submachine gun
SR	Sniper Rifle
M	Melee
MT	Melee Throw
ML	Melee Launcher (Bow)

WeaponName The Weapon name should not contain any symbols and no spaces. The name should be dragged together and use only Letters and numbers.

XML file Example:

Note: This is an example and that means that it is not 100% accurate.

```
1.  <?xml version="1.0" encoding="utf-8" ?>
2.  <ThingDefs>
3.
4.  <!-- Project License and Author -->
5.
6.      <ThingDef Name="BaseGun" Abstract="True">
7.          <category>Item</category>
8.          <eType>Equipment</eType>
9.          <thingClass>Equipment</thingClass>
10.         <equipmentType>Primary</equipmentType>
11.         <pathCost>10</pathCost>
12.         <useStandardHealth>True</useStandardHealth>
13.         <selectable>True</selectable>
14.         <onGroundRandomRotateAngle>35</onGroundRandomRotateAngle>
15.         <drawGUIOverlay>true</drawGUIOverlay>
16.         <statBases>
17.             <MaxHealth>100</MaxHealth>
18.             <Flammability>1.0</Flammability>
19.             <DeteriorationRate>1</DeteriorationRate>
20.         </statBases>
21.         <altitudeLayer>Item</altitudeLayer>
22.         <alwaysHaulable>True</alwaysHaulable>
23.         <tickerType>Never</tickerType>
24.         <techLevel>Midworld</techLevel>
25.         <thingCategories>
26.             <li>WeaponsSubmachineGuns</li>
27.         </thingCategories>
28.         <inspectorTabs>
29.             <li>ITab_Art</li>
30.         </inspectorTabs>
31.         <comps>
32.             <li>
33.                 <compClass>CompForbiddable</compClass>
34.             </li>
35.             <li>
36.                 <compClass>CompQuality</compClass>
```

```
            </li>
            <li>
                <compClass>CompArt</compClass>
                <nameMaker>NamerGun</nameMaker>
                <descriptionMaker>ArtWeaponGun</descriptionMaker>

        <minQualityForArtistic>Excellent</minQualityForArtistic>
            </li>
        </comps>
        <smeltProducts>
          <Steel>10</Steel>
        </smeltProducts>
    </ThingDef>

    <ThingDef Name="BaseHumanGun" ParentName="BaseGun"
Abstract="True">
        <weaponTags>
            <li>Gun</li>
        </weaponTags>
    </ThingDef>

    <!-- ================================================== -->

    <ThingDef ParentName="BaseHumanGun">
        <defName>Gun_FNP90TR_PA</defName>
        <label>FN P90 TR</label>
        <description>The FN P90 is a personal defense weapon (PDW)
designed and manufactured by FN Herstal in Belgium.\nCaliber: FN
5.7x28mm</description>
        <graphicPath>Things/Item/Gun_SMG_FNP90TR</graphicPath>
        <graphicClass>Graphic_Single</graphicClass>
        <soundInteract>InteractSMG</soundInteract>
        <tradersCarry>True</tradersCarry>
        <statBases>
            <MarketValue>285</MarketValue>
            <AccuracyTouch>0.87</AccuracyTouch>
            <AccuracyShort>0.99</AccuracyShort>
            <AccuracyMedium>0.89</AccuracyMedium>
            <AccuracyLong>0.76</AccuracyLong>
        </statBases>
        <verbs>
            <li>
                <verbClass>Verb_Shoot</verbClass>
                <hasStandardCommand>true</hasStandardCommand>
                <projectileDef>Bullet_FN57x28mm_SMG_PA</projectileDef>
                <warmupTicks>90</warmupTicks>
                <baseCooldownTicks>40</baseCooldownTicks>
                <range>28.6</range>
                <burstShotCount>5</burstShotCount>
                <ticksBetweenBurstShots>4</ticksBetweenBurstShots>
                <soundCast>ShotPDW</soundCast>
                <soundCastTail>GunTail_Light</soundCastTail>
            </li>
        </verbs>
    </ThingDef>
</ThingDefs>
```

When you have a file you need to fix the file to make it work in the game. You should follow this and also try to have the weapon as close to vanilla values and balanced as possible

pathCost

The Path cost how hard it is to pass over the weapon. The lower the value the more easy it is to pass over it. Currently all weapon uses **10**. But heavier weapons may, in the future, use higher value.

MaxHealth

This is the weapons health normally a weapon have **100**. But some weapons like the AK have slightly higher to simulate the quality design, and some weapons may have lower.

Flammability

Flammability is how well the weapon catches fire. **1.0** is the standard value.

DeteriorationRate

Deterioration Rate is the rate witch the weapons health decline when left in weather and wind. Default value is **1** the AK series have a slightly lower DeteriorationRate to simulate its design.

techLevel

Tech level decides on how complicated and how common the weapon is. Current available tech levels are the following:

Neolithic
Midworld
Spacer

thingCategories
weaponTags

The **tags** that exist is the following:

```
Gun
SniperRifle
Grenade
GunHeavy
AdvancedGun
```

defName

defName format:

Gun_WeaName_PA

Gun	The name start indicates that it is a new weapon.
WeaName	The weapon name should not contain any symbols and no spaces. The name should be dragged together and use only Letters and numbers. See the example above.
PA	The PA tag is used to make sure there are no XML errors due to numbers at the end. But it is also used to make the Project Armory Weapons more unique.

label

The full weapon name and also correct one. The **Assault rifle** for example is renamed in the mod to **M16A1**. The **FN P90 TR** is named **FN P90 TR** etc. The name should always have the full name and even the insignia H&K or FN if available.

description

A small description of the weapon. Mostly it is copied from Wikipedia. At the end of the description though you should add:
\nCaliber: X

graphicPath
graphicClass

Graphics is the path to the weapon. The path to the graphic should be: **\Textures\Things\Item**
The only **graphicClass** we use are the following: **Graphic_Single**

soundInteract
soundCast

Current Available Sounds:

MarketValue

Market Value is an estimated value that you need to do from the top of your head. We can offer guidelines for you but not give you a system for cost estimation.

PawnKindDef cost range:

PawnKindDef	Cost Range		weaponTags
Colonist	0	0	
MercenaryGunner	400	700	Gun
MercenarySniper	1200	1800	SniperRifle
Grenadier	100	500	Grenade
MercenarySlasher	1200	2000	Melee
PirateBoss	1600	2000	AdvancedGun
MercenaryElite	1600	2000	AdvancedGun
MercenaryHeavy	1600	2000	GunHeavy
Villager	0	250	Gun, Melee
TownCouncilman	0	250	Gun, Melee
TownGuard	200	600	Gun
Drifter	60	100	Gun, Melee
Scavenger	250	450	Gun
Thrasher	60	150	Melee
Pirate	450	600	Gun
Slave	0	0	
SpaceRefugee	0	0	
SpaceSoldier	300	900	Gun

NOTE: *A pawn will not grab a weapon above his cost range. This is also bound to the tag.*

Project Armory Cost Range Examples	Vanilla Cost	PA Cost Range	
Assault Rifle Energy Rifle Heavy Machine Gun Heavy SubMachine Gun Launcher Light Machine Gun	650	230	1200
Pistol	200	50	500

AccuracyTouch
AccuracyShort
AccuracyMedium
AccuracyLong

projectileDef

Find the bullet def in the BulletDef file.
**See the chapter Make a New Bullet on page 8. If the bullet does not exist in order to create a new one.*

warmupTicks

Warmup time is the time in ticks before you fire. It is calculated in this way:
nil

baseCooldownTicks

Cooldown time is the time in ticks you have to wait in order to start the warmup again. The cooldown also freezes the pawns movement and other action until it runs out. It is calculated in this way:
nil

range

Formula:

```
range = ( ( [Velocity] / 20) + ( [Barrel Length] / 20 ) / 4 ) + [Adjustment Value]
```

Weapon Class	Adjustment Value
AR	16.2
HMG	10.0
LMG	9.9

P	20.4
R	21.6
S	1.7
HSMG	
SMG	16.7
SR	28.5

burstShotCount

burstShotCount or simply Burst count is the amount of bullets fired. A semi-automatic weapon or bolt action doesn't have this string. When calculating this you should be mindful of the accuracy and range. If you shoos many rounds you should have a low accuracy and vice versa.

ticksBetweenBurstShots

This is the time between each round fired semi-automatic weapon or bolt action doesn't have this string. In project armory we use the following calculation to determine the ticksBetweenBurstShots.

Formula:

```
ticksBetweenBurstShots = -[Average Cyclic Rate of
        Fire] * 0,009 + [Adjustment Value]
```

Weapon Class	Adjustment Value
AR	14
ARS	
HMG	16
LMG	20
P	13
R	14
S	10
HSMG	
SMG	12
SR	14

***Note: If a weapon get 1 ticksBetweenBurstShots the number should be rounded up to 2. And if the value is 2 round it up to 3.**

soundCast
soundCastTail

There are currently these sounds available:

soundCast names	soundCastTail names
ShotPistol	GunTail_Light
ShotShotgun	GunTail_Medium
ShotSurvivalRifle	GunTail_Heavy
ShotAssaultRifle	
ShotSniperRifle	
ShotPDW	
ShotHeavySMG	
ShotIncendiaryLauncher	
ShotMinigun	
ShotChargeRifle	
GunShotA	
InfernoCannon_Fire	

MAKE A NEW BULLET

You want to make a new bullet to the mod. How do i do this? Well this chapter tells you how to and what you should do when making one.

NOTE:

If you are an art developer you only need to do stage 1 and 2. If you are a programmer and don't handle art you can skip stage 2 and jump to stage 3.

1. MANTIS

Name format:

```
New Bullet: [M/G] BulletName
```

New Bullet	The name start indicates that it is a new bullet.
M/G	This tag declares if it is a game or movie weapon. Skip it if it isn't a movie or game weapon.
BulletName	The weapon name the weapon name should not contain any symbols and no spaces. The name should be dragged together and use only Letters and numbers.

Examples of the format:

```
New Bullet: FN 5.7x28mm
New Bullet: 5.56x45mm NATO
New Bullet: [StarWars] Laser
```

2. BULLET ART

Make a picture resembling the bullet or use a preexisting one.

Art Examples:

Bullet art naming format

```
NoXMLTag_Gun_WeaponName.png
```

NoXMLTag	Is **ONLY** used when there is no xml file for the weapon. You add this to the name: NoXML_
Gun	This tag just say that it is a gun texture
WeaponName	The weapon name the weapon name should not contain any symbols and no spaces. The name should be dragged together and use only Letters and numbers.

All texture files should be located: **\Textures\Things\Projectile**

3. RESEARCH

Research the bullet; what is the name, does it have variants, what's the velocity in m/s and what is the Energy in J.

4. MAKE THE XML

NOTE:

All throwable weapons, grenades, melee, including bows have there bullet defined IN the weapon itself.

When making the XML you could always copy past an already finished weapon. The naming of the xml file follow the following format:
PA_BulletDef_WorldTag.xml

PA	The PA tag is used to make sure all the PA bullets are shorted together. But it is also used to make the Project Armory bullets more unique.
BulletDef	The BulletDef indicates that it is a bullet file.
WorldTag	The World tag is used were the weapon appear or is used. See Stage 4 **Make the XML: WeaponClass** on Pg.3. for weapon tags.

XML file Example:

```
<!—Coming soon!-->
```

When you have a file you need to fix the file to make it work in the game. You should follow this and also try to have the weapon as close to vanilla values and balanced as possible:

defName

defName format:

Bullet_BulletName_WeaponClass_PA

Bullet	The name start indicates that it is a new weapon.
BulletName	The BulletName should not contain any symbols and no spaces. The name should be dragged together and use only letters and numbers. See the example above.
WeaponClass	Weapon class it to know what class category the weapon belong. See Stage 4 **Make the XML: WeaponClass** on Pg.3.
PA	The PA tag is used to make sure there are no XML errors due to numbers at the end. But it is also used to make the Project Armory Bullets more unique.

label

The full bullet name and also correct one. The **5.56x45mm NATO** is named **5.56x45mm NATO** and nothing else. Don't forget to change the × to a letter x if you copy paste the bullet name. Same goes for defName.

graphicPath
graphicClass

Graphics is the path to the weapon. The path to the graphic should be: **\Textures\Things\Projectile**
The only **graphicClass** we use are the following: **Graphic_Single**

damageDef

DamageDef is the kind of projectile you are using.
Currently there are the following projectiles:

DamageDef	Description
Arrow	This gives pawns penetration by arrow type of damage.
Bite	This gives pawns a bite type of damage.
Blunt	This gives pawns a blunt type of damage.
Bomb	
Bullet	This gives pawns penetration by bullet type of damage.
Crush	This gives pawns crush type of damage.
Cut	
Deterioration	
EMP	
Extinguish	
Flame	
Frostbite	This gives a pawn frostbite type of damage.
HealGlobal	

HealInjury
Mining
Repair
RestoreBodyPart
Rotting
Scratch
Stab
Stun
SurgicalCut

damageAmountBase

Formula:

```
damage = ( [ENERGY] / 500 )
    + [Adjustment Value]
```

Weapon Class	Adjustment Value
AR	3.0
ARS	
HMG	0.0
LMG	1.0
P	9.0
R	11
S	
HSMG	
SMG	3.0
SR	27

speed

Formula:

```
speed = ( [VELOCITY] / 200 )
    + [Adjustment Value]
```

Weapon Class	Adjustment Value
AR	65.3
ARS	
HMG	54.3
LMG	66.0
P	53.3
R	65.3
S	
HSMG	
SMG	53.3
SR	95.3

DOCUMENTATION GUIDE

DPS Formula:

Dps_At_Medium_Range = Acc_at_medium_range x Damage x BurstShotsCount / (BurstShotInterval*BurstShotsCount + BurstInterval)

EXPLAINING FORMULAS

RANGE FORMULA

The formula for range work like this:

```
range = ( ( [Velocity] / 100) + ( [Barrel Length] / 20) / 4 ) +
                                [AdjustmentValue]
```

The Velocity is the real world caliber velocity. This is divided in 100 to make the value smaller. Then you add the Barrel Length and this is the real world barrel length, you then divide this with 20. This is also to get down the numbers and have the barrel length effect the range more than the Velocity. These two values are then divided in 4; to dump the numbers even more. Finally you add Adjustment Value. This value makes the formula match the vanilla weapons range value.

TICKSBETWEENBURSTSHOTS FORMULA

The formula for ticksBetweenBurstShots or Rate of fire, works like this:

```
ticksBetweenBurstShots = -[Average Cyclic Rate of Fire] * 0,009 +
                                [AdjustmentValue]
```

The is the average of the top and low Rate of Fire this is * by 0,009. This is to dump the value. Finally you add Adjustment Value. This value makes the formula match the vanilla weapons range value.