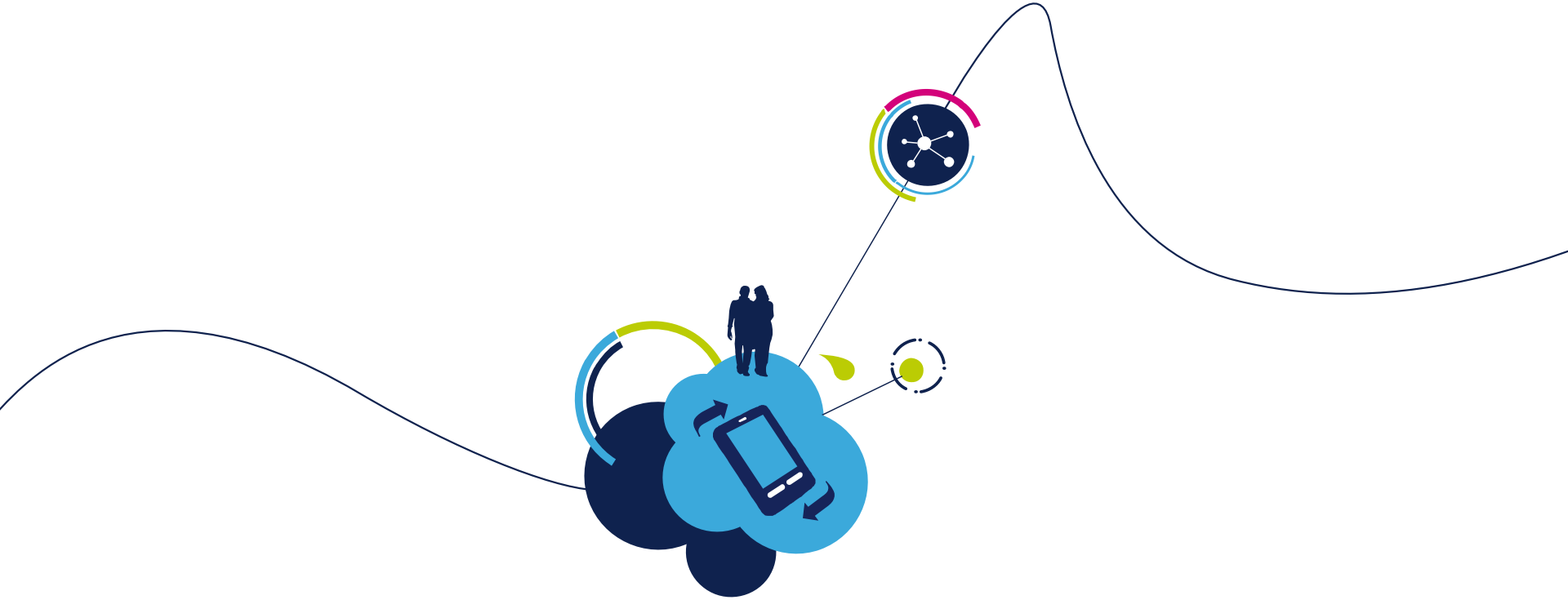
STM32

Training Hands on and Tools overview

life.augmented

life.augmented



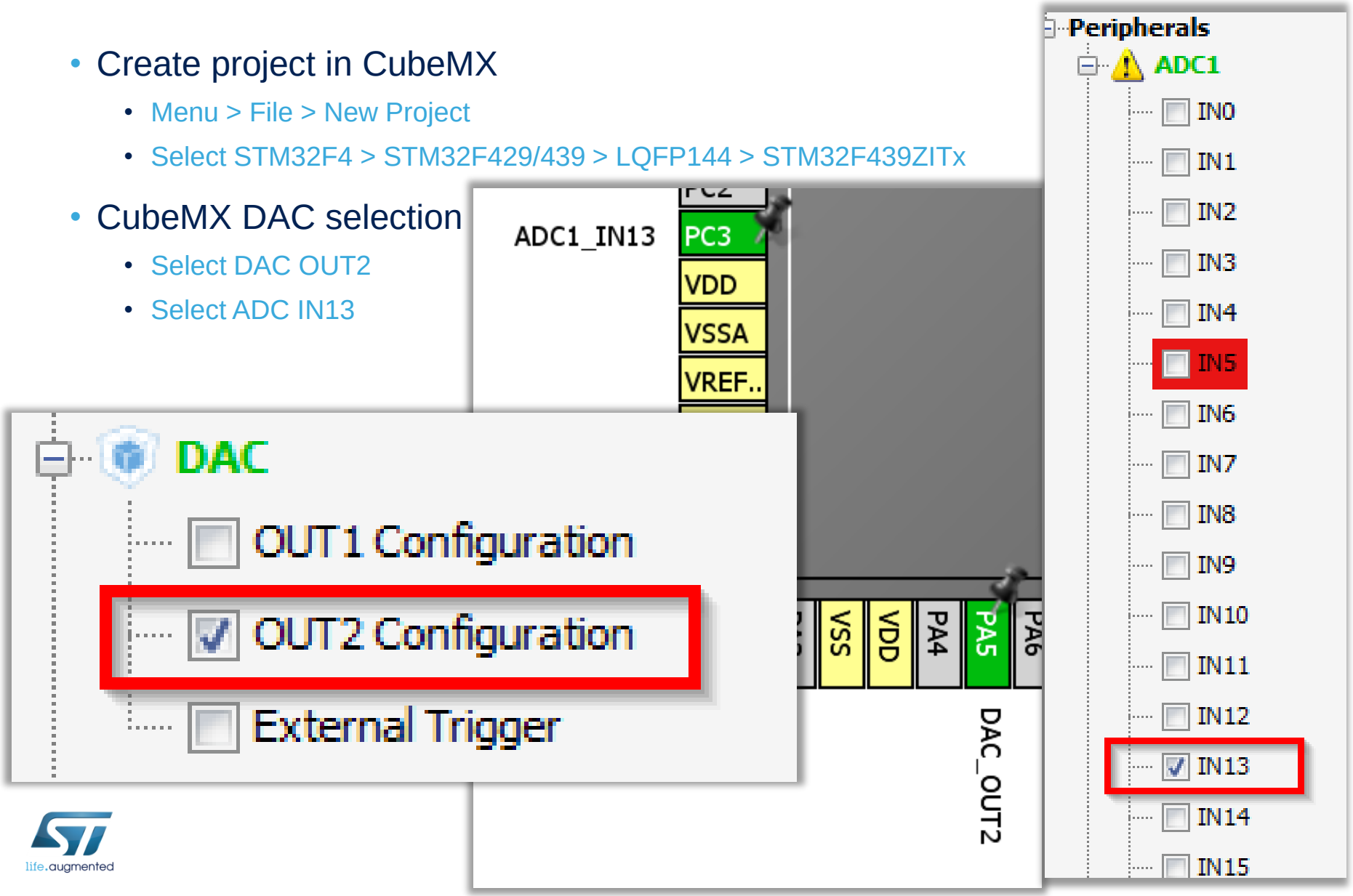
4.1.3 ADC with DMA lab

4.1.3 Use ADC with DMA

- Objective
  - Use the DAC part from previous lab
  - Learn how to setup ADC with DMA in CubeMX
  - How to Generate Code in CubeMX and use HAL functions
- Goal
  - Configure ADC in DMA in CubeMX and Generate Code
  - Learn how to start ADC and measure the DAC
  - Verify the measured wave in STMStudio (http://www.st.com/web/en/catalog/tools/PF251373 require JAVA)

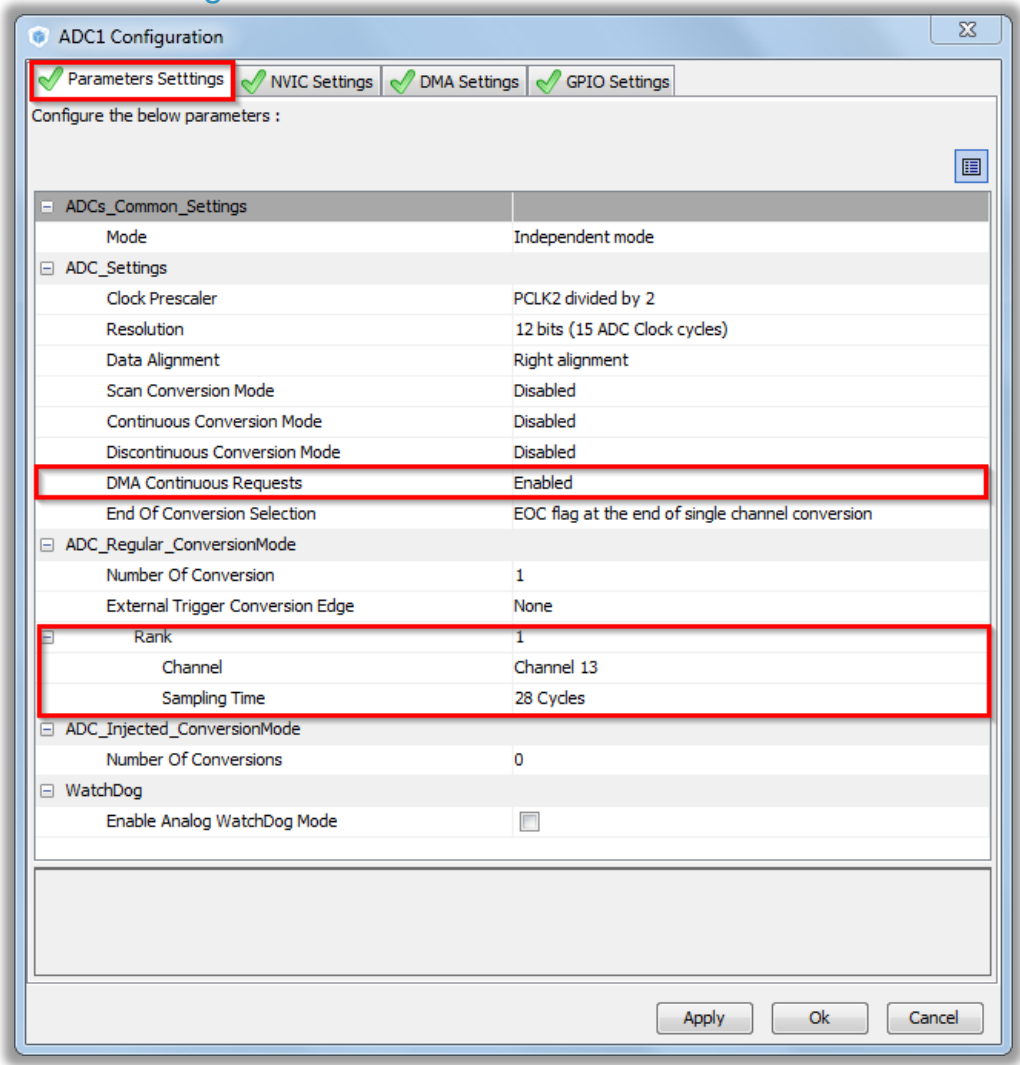
4.1.3 Use ADC with DMA

- Create project in CubeMX
  - Menu > File > New Project
  - Select STM32F4 > STM32F429/439 > LQFP144 > STM32F439ZITx
- CubeMX DAC selection
  - Select DAC OUT2
  - Select ADC IN13



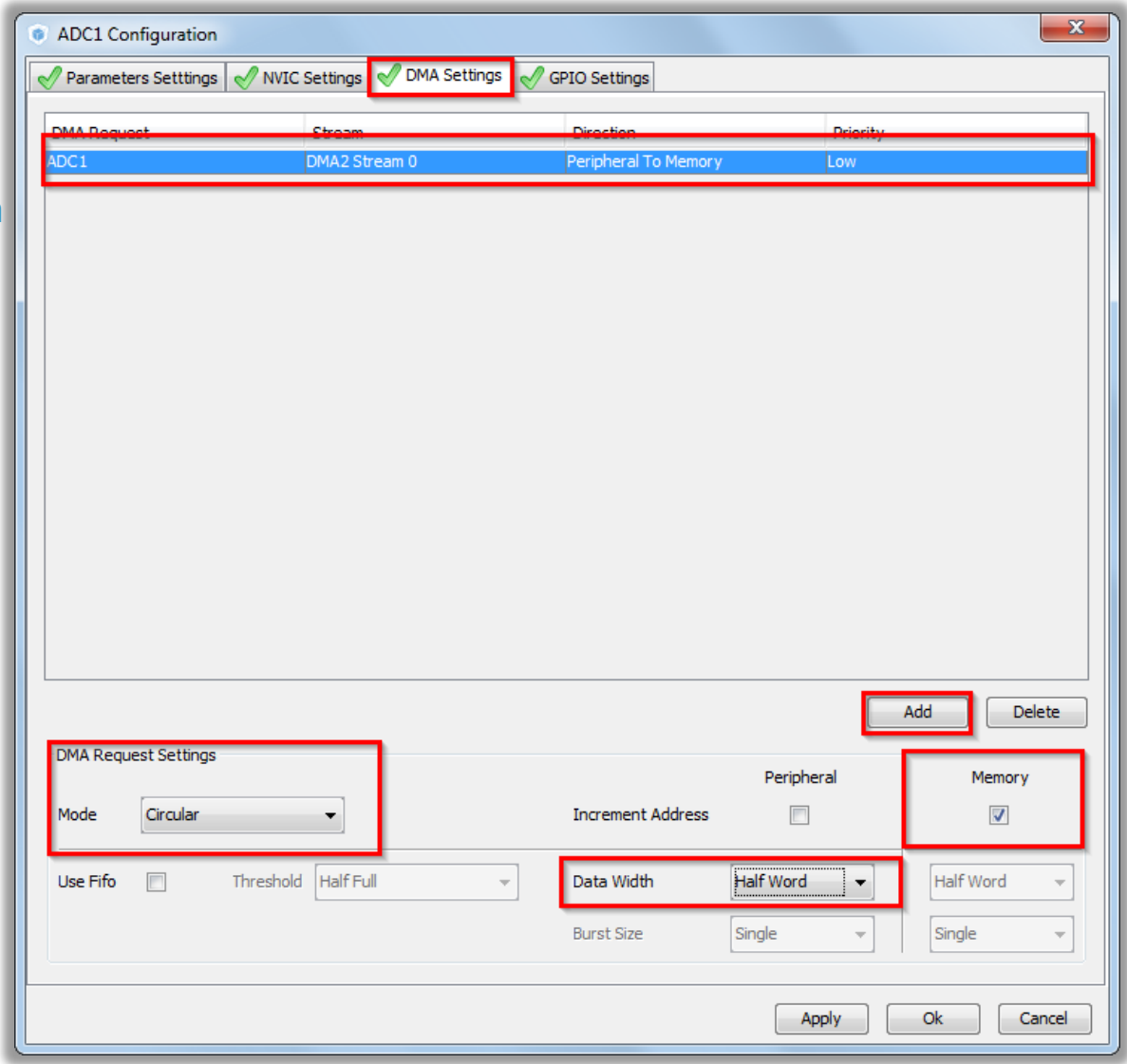
4.1.3 Use ADC with DMA

- CubeMX ADC configuration
  - TAB>Configuration>Analog>ADC1>Parameter Settings
  - Set ADC1
  - Set sampling time for CH13
  - DMA Continuous requests
  - Button OK
- DAC from previous example



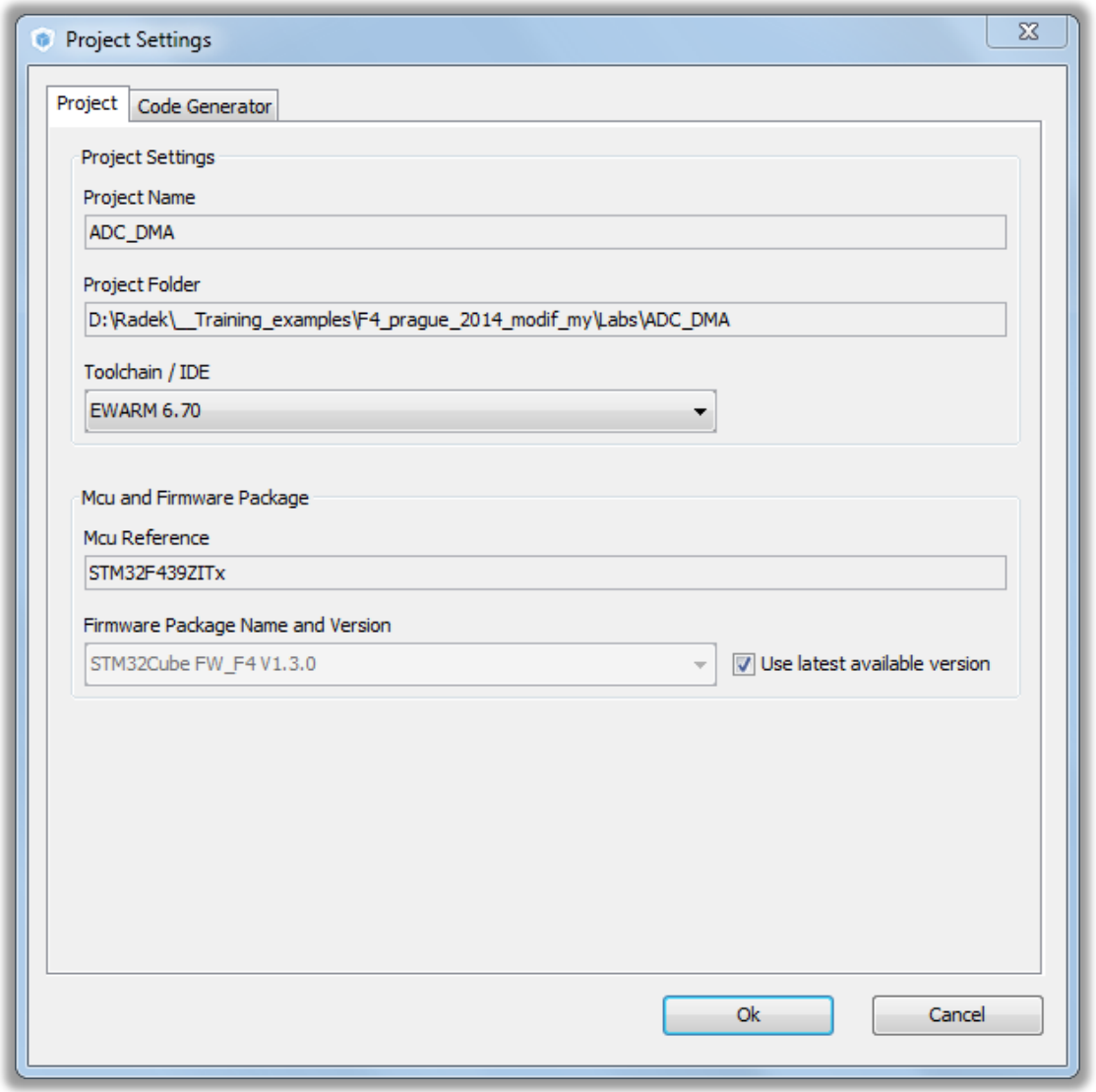
4.1.3 Use ADC with DMA

- CubeMX ADC configuration
  - TAB>DMA Settings
  - Button ADD
  - DMA request ADC1
  - Peripheral to memory direction
  - Circular mode
  - Memory increment
  - Half word data width
  - Button OK



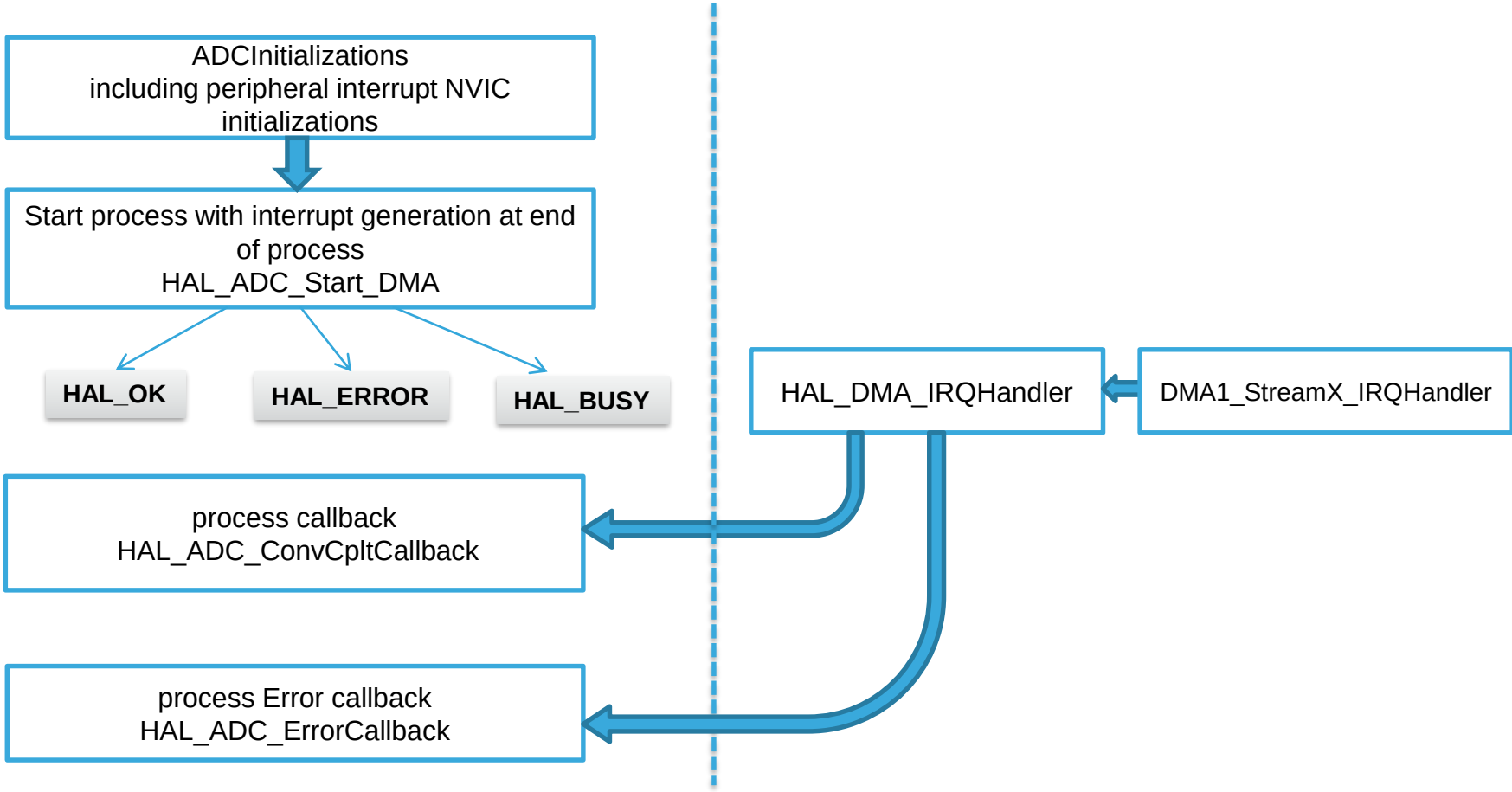
4.1.3 Use ADC with DMA

- Now we set the project details for generation
  - Menu > Project > Project Settings
  - Set the project name
  - Project location
  - Type of toolchain
- Now we can Generate Code
  - Menu > Project > Generate Code



4.1.3 Use ADC with DMA

HAL Library ADC with DMA flow



4.1.3 Use ADC with DMA

- Open the project in our IDE
  - The functions we want to put into main.c
  - Between /* *USER CODE BEGIN 2* */ and /* *USER CODE END 2* */ tags
  - and /* *USER CODE BEGIN 3* */ and /* *USER CODE END 3* */ tags
- For DAC start use function
  - HAL_ADC_Start_DMA(ADC_HandleTypeDef* hadc, uint32_t* pData, uint32_t Length)
- DAC functions
  - HAL_DAC_Start(DAC_HandleTypeDef* hdac, uint32_t Channel)
  - HAL_DAC_SetValue(DAC_HandleTypeDef* hdac, uint32_t Channel, uint32_t Alignment, uint32_t Data)

4.1.3 Use ADC with DMA

- Solution
  - Variables

```
/* USER CODE BEGIN PV */
uint32_t value_adc;
uint32_t value_dac=0;
/* USER CODE END PV */
```

  - DAC setup and start ADC/DAC

```
 /* USER CODE BEGIN 2 */
  HAL_DAC_Start(&hdac,DAC_CHANNEL_2);
  HAL_DAC_SetValue(&hdac, DAC_CHANNEL_2, DAC_ALIGN_12B_R, value_dac);
  HAL_ADC_Start_DMA(&hadc1,(uint32_t*)&value_adc,1);
  /* USER CODE END 2 */
```

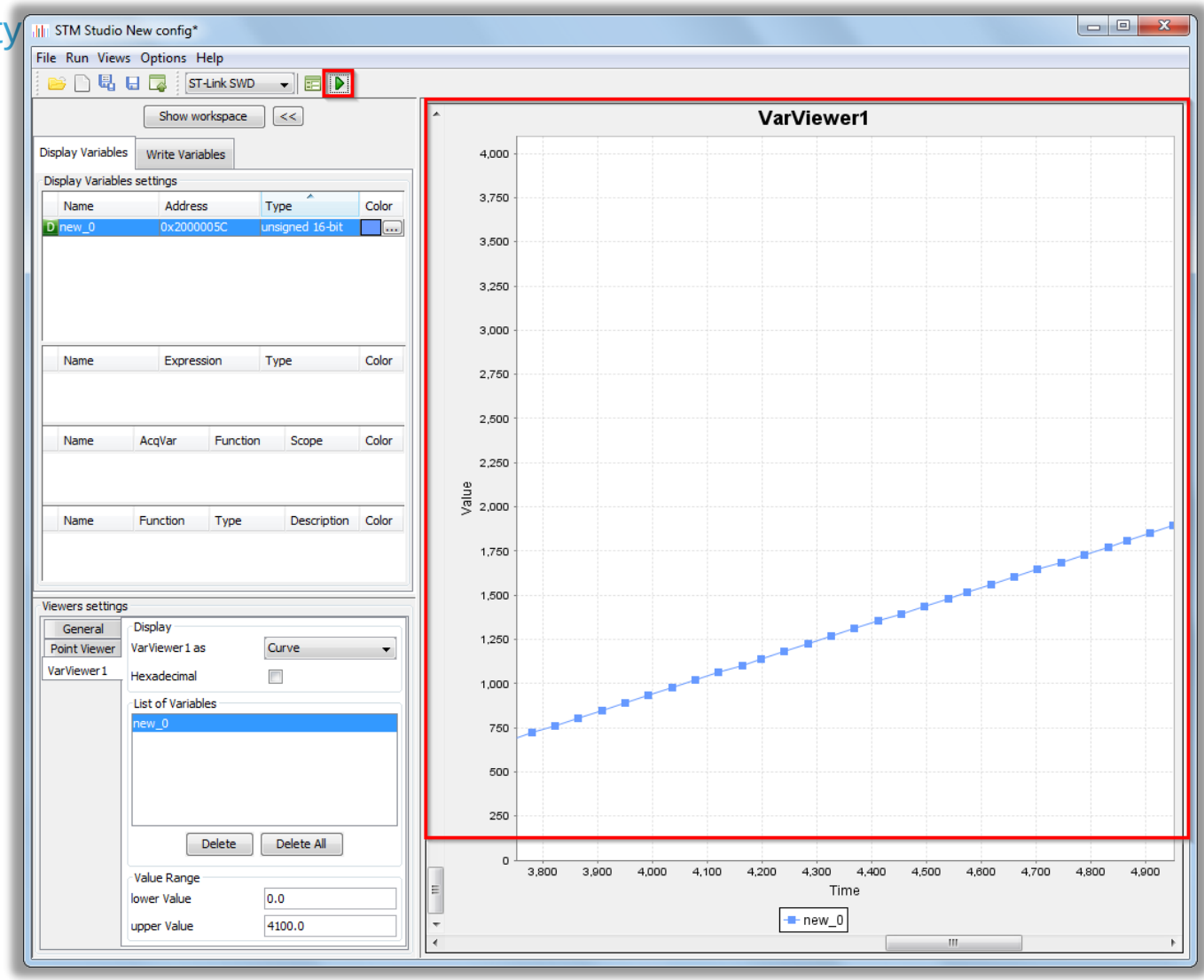
4.1.3 Use ADC with DMA

- Solution
  - ADC main routine

```
/* USER CODE BEGIN 3 */
 /* Infinite loop */
 while (1)
 {
   HAL_DAC_SetValue(&hdac, DAC_CHANNEL_2, DAC_ALIGN_12B_R, value_dac);
   value_dac++;
   if(value_dac>4095){
     value_dac=0;
   }
   HAL_Delay(5);
   HAL_ADC_Start(&hadc1);
   HAL_Delay(5);
 }
 /* USER CODE END 3 */
```

4.1.3 Use ADC with DMA

- STM studio settings
  - Check functionality again with STMstudio



life.augmented

B CubeMX documentation

- CubeMX user manual UM1718
  - http://www.st.com/st-web-ui/static/active/en/resource/technical/document/user_manual/DM00104712.pdf
- CubeMX release note RN0094
  - http://www.st.com/st-web-ui/static/active/en/resource/technical/document/user_manual/DM00104712.pdf
- CubeMX technical note TN0072
  - http://www.st.com/st-web-ui/static/active/en/resource/technical/document/technical_note/CD00214439.pdf

STM32F429i-Discovery documentation

- STM32F429i-Discovery page
  - http://www.st.com/web/en/catalog/tools/FM116/SC959/SS1532/LN1848/PF259090?s_searchtype=keyword
- STM32F429i-Discovery user manual with discovery schematics
  - http://www.st.com/st-web-ui/static/active/en/resource/technical/document/user_manual/DM00093903.pdf