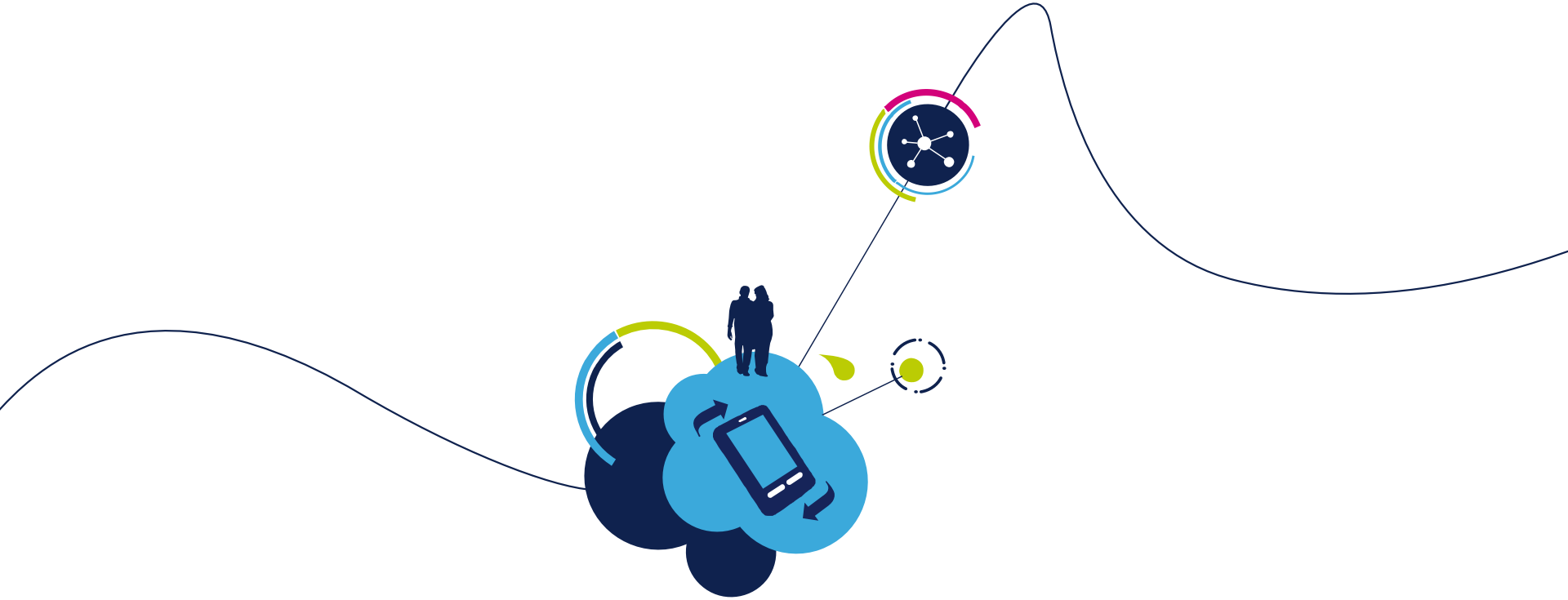


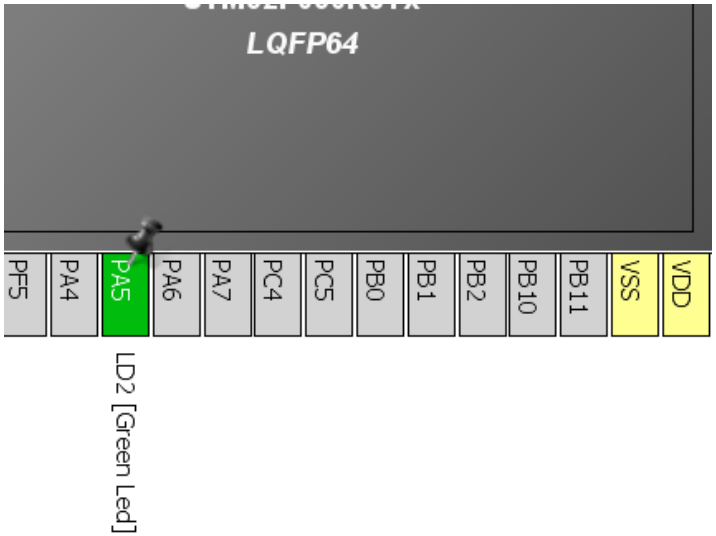
3.2.1 TIM with interrupt lab

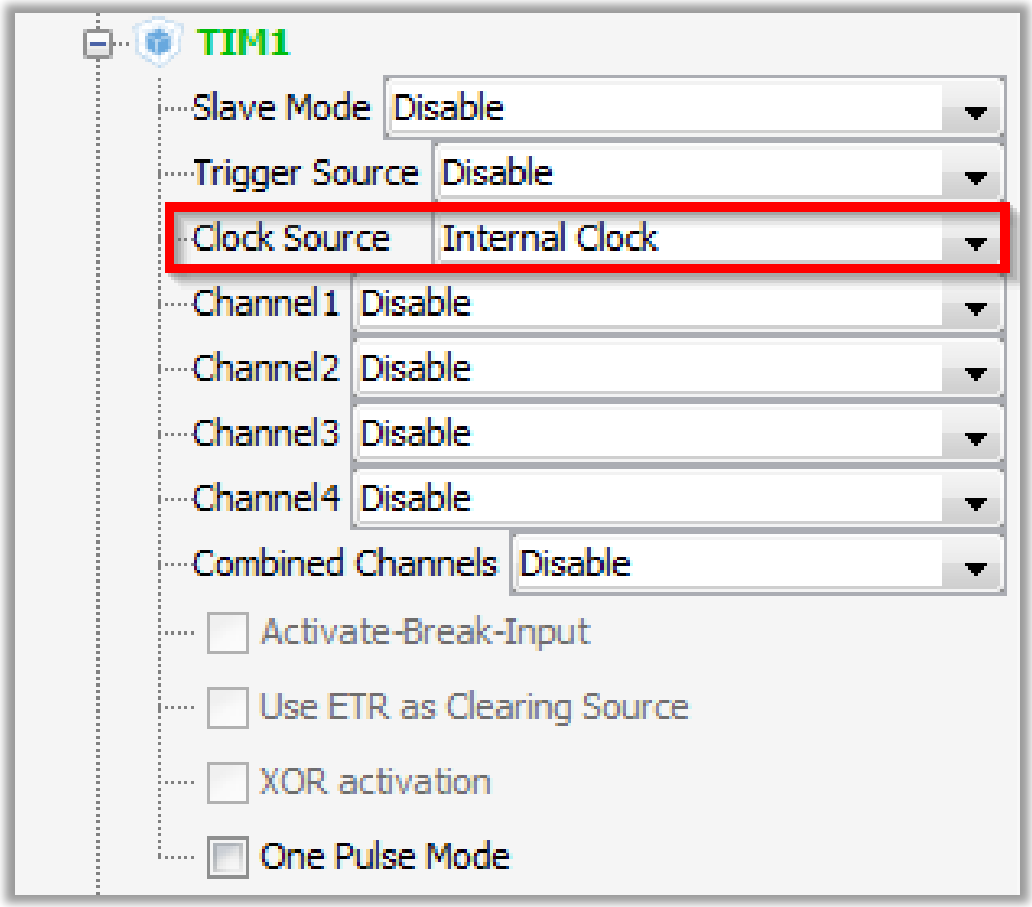
3.2.1 Use TIM with interrupt

- Objective
  - Learn how to setup TIM with Interrupt in CubeMX
  - How to Generate Code in CubeMX and use HAL functions
  - Indicate TIM interrupt with LED toggle
- Goal
  - Configure TIM in CubeMX and Generate Code
  - Learn how start timer and handle interrupt
  - Verify the correct functionality

3.2.1 Use TIM with interrupt

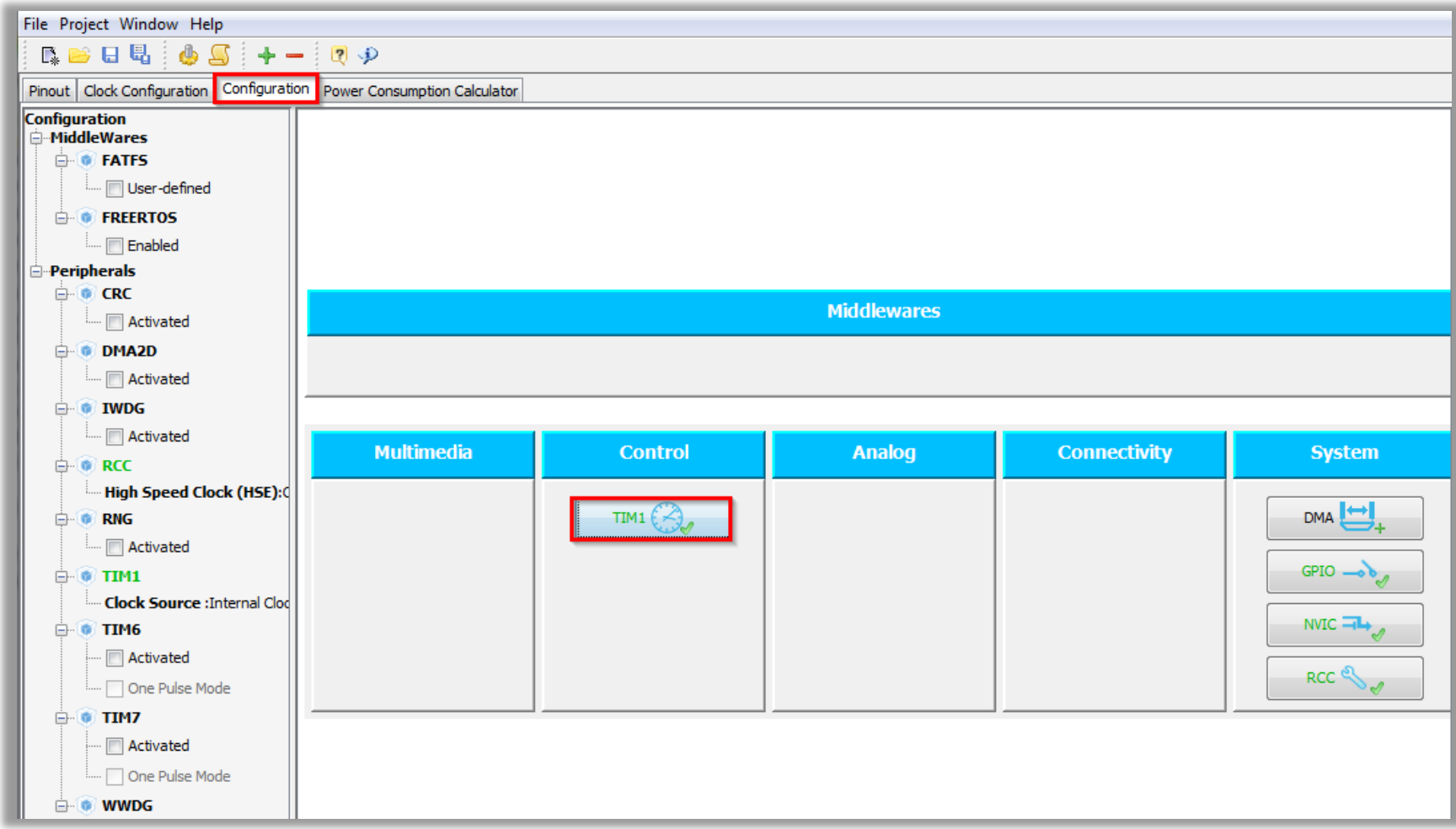
- Create project in CubeMX
  - Menu > File > New Project
  - Select STM32F0 > STM32F030 > LQFP64 > STM32F030R8
- CubeMX TIM selection
  - Select TIM clock source Internal clock
  - Enable GPIO for LED PA5





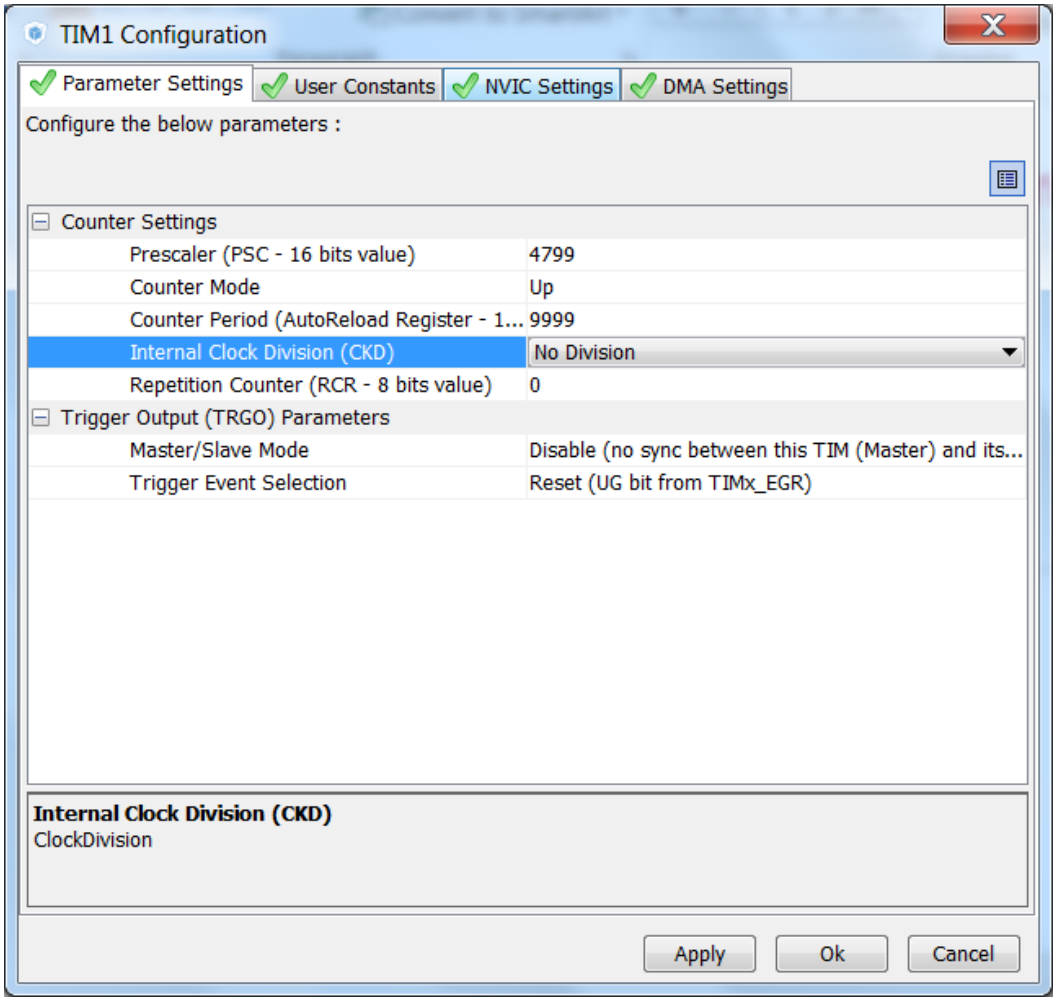
3.2.1 Use TIM with interrupt

- CubeMX TIM configuration
  - Tab>Configuration>Control>TIM1
  - Check the settings



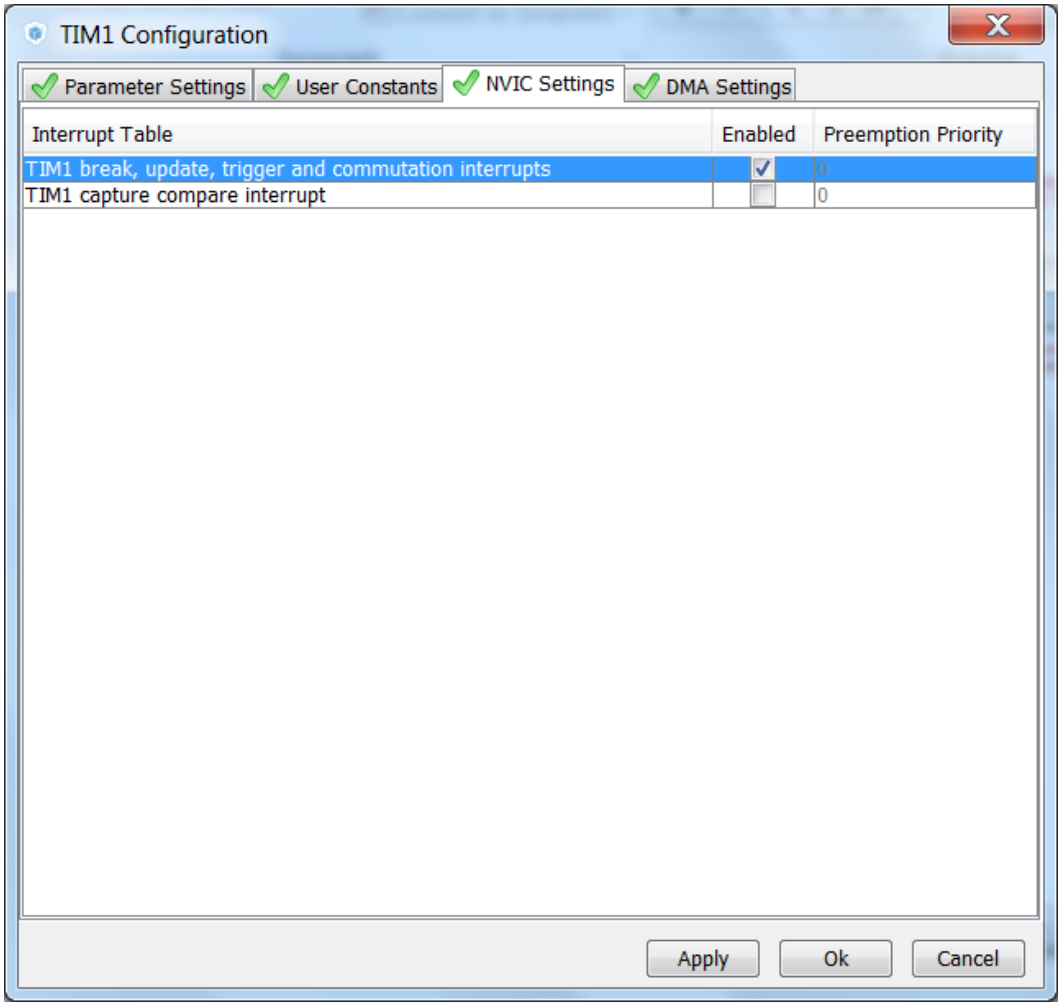
3.2.1 Use TIM with interrupt

- CubeMX TIM configuration
  - Tab>Parameter Settings
  - Prescaler to 4799
  - Counter period to 9999
  - Together with 48MHz TIMER1 clock we get period 1Hz



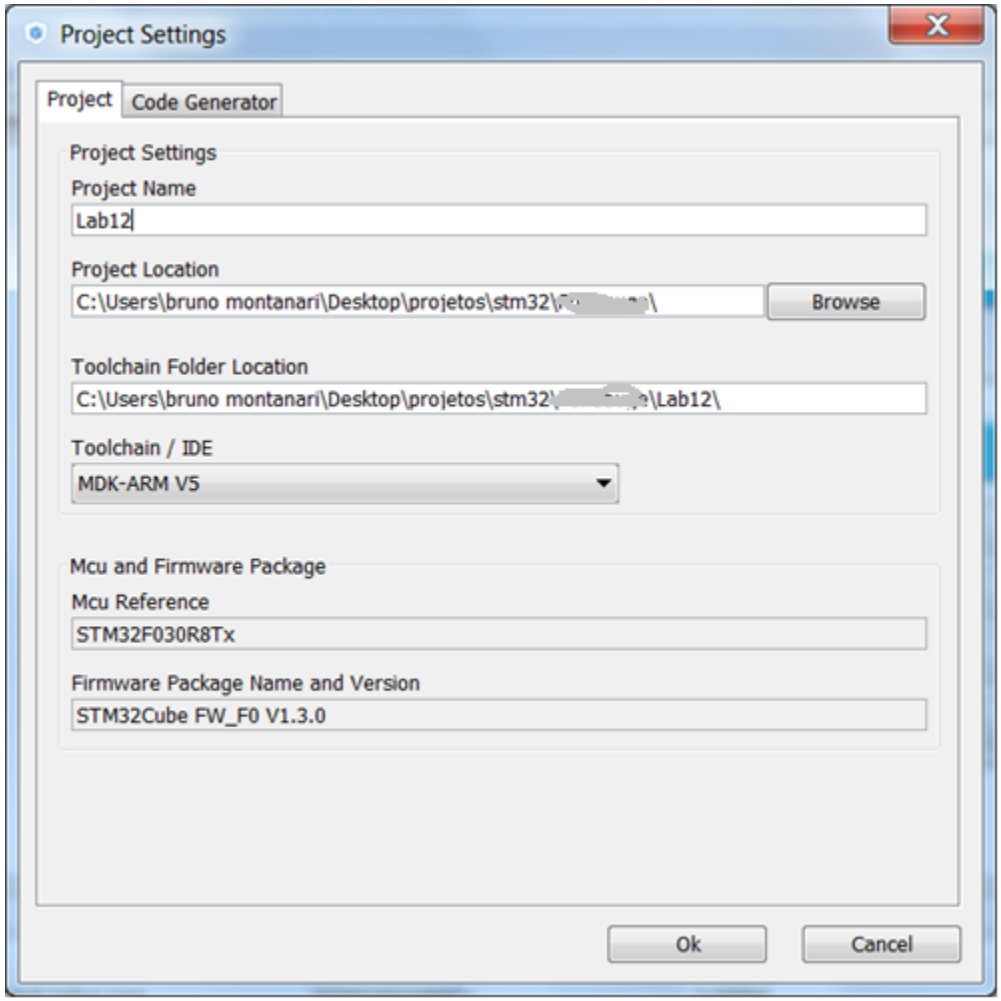
3.2.1 Use TIM with interrupt

- CubeMX TIM configuration
  - Tab>NVIC Settings
  - Enable TIM1 Update interrupt
  - Button OK



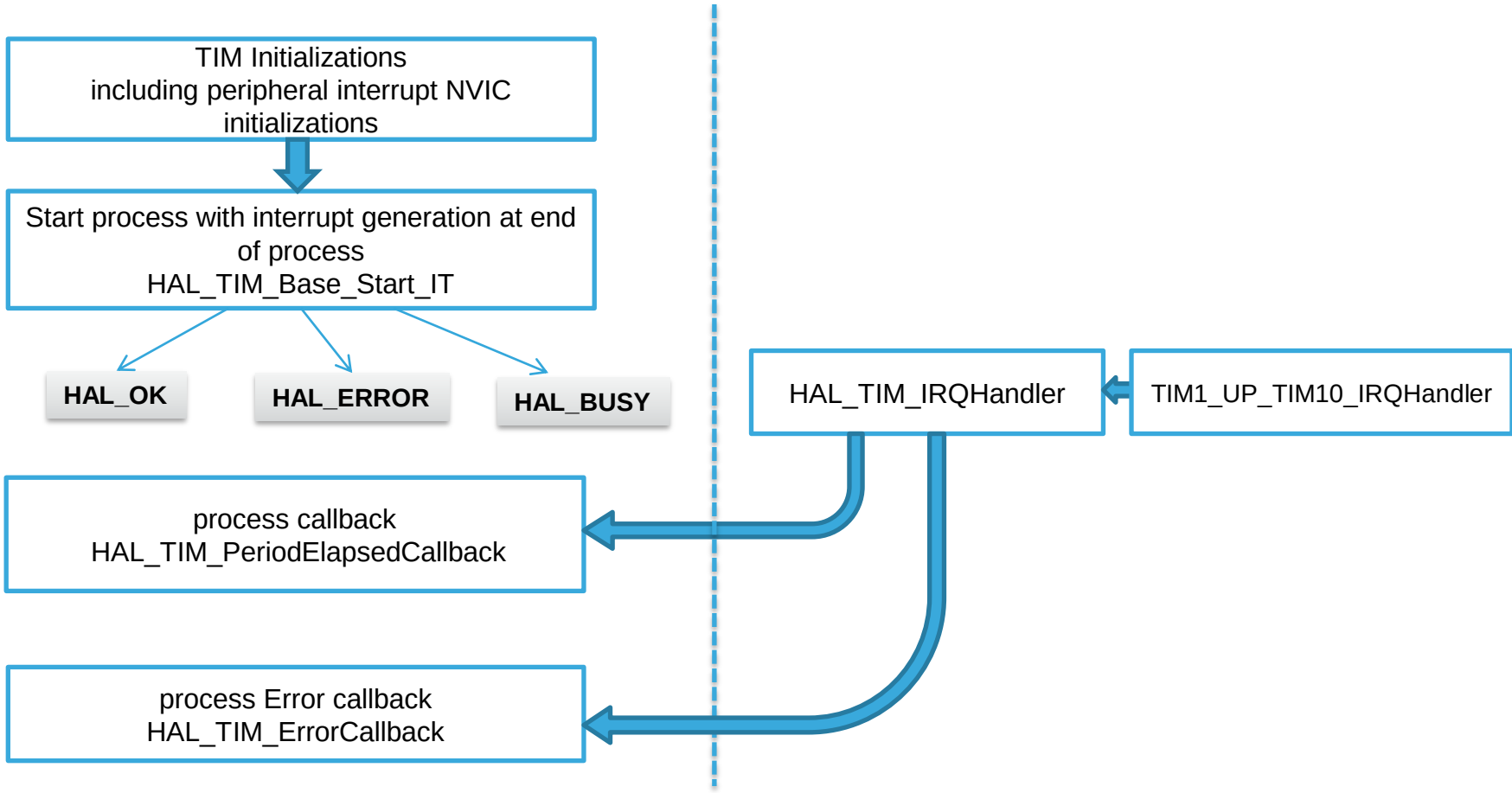
3.2.1 Use TIM with interrupt

- 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



3.2.1 Use TIM with interrupt

HAL Library TIM with IT flow



3.2.1 Use TIM with interrupt

- 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
- For TIM start use function
  - HAL_TIM_Base_Start_IT(TIM_HandleTypeDef *htim)
- TIM callback
  - void TIM1_UP_TIM10_IRQHandler(void)
- GPIO LED toggle
  - HAL_GPIO_TogglePin(GPIO_TypeDef* GPIOx, uint16_t GPIO_Pin)

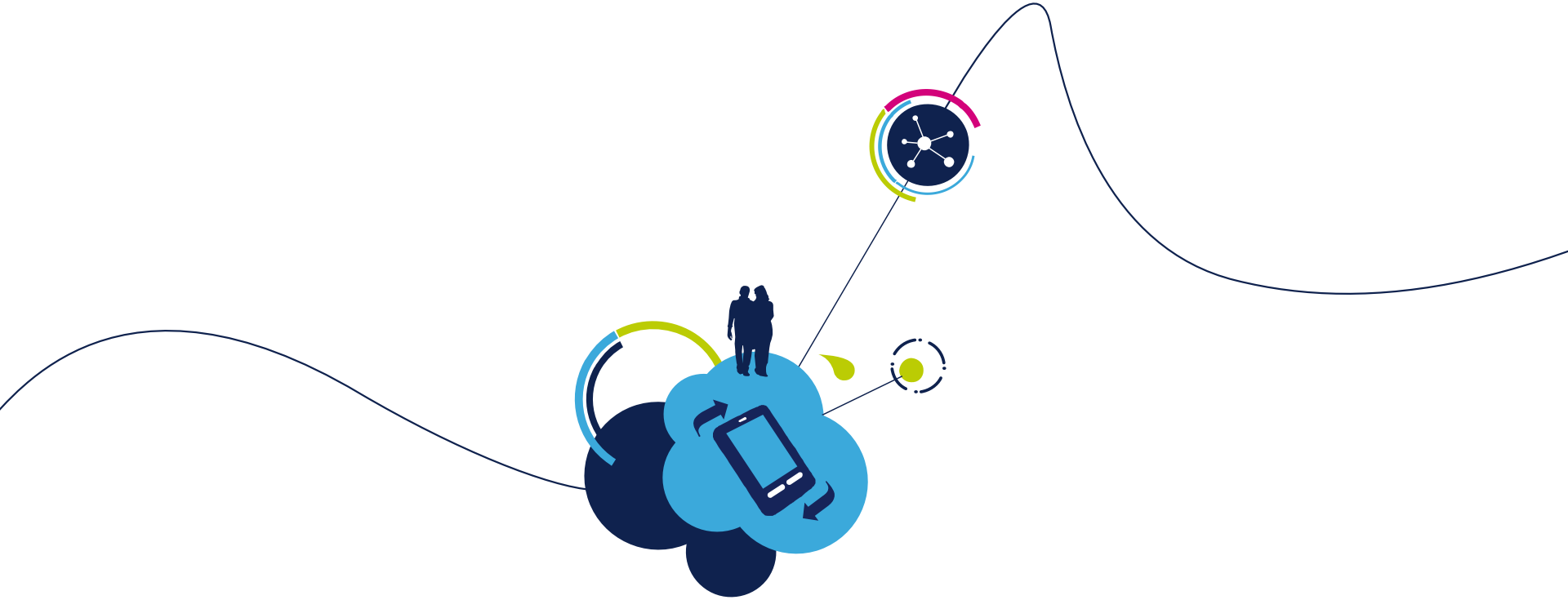
3.2.1 Use TIM with interrupt

- Solution
  - TIM start

```
 /* USER CODE BEGIN 2 */
  HAL_TIM_Base_Start_IT(&htim1);
  /* USER CODE END 2 */
```

  - Callback handling

```
/* USER CODE BEGIN 4 */
void HAL_TIM_PeriodElapsedCallback(TIM_HandleTypeDef *htim)
{
  HAL_GPIO_TogglePin(GPIOA,GPIO_PIN_5);
}
/* USER CODE END 4 */
```



Appendix B Documents

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