



AI-Driven Software Design and Development for AURIX TC4x in MATLAB and Simulink

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07.05.2024



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Problem Statement: Embedded SW Development on AURIX™

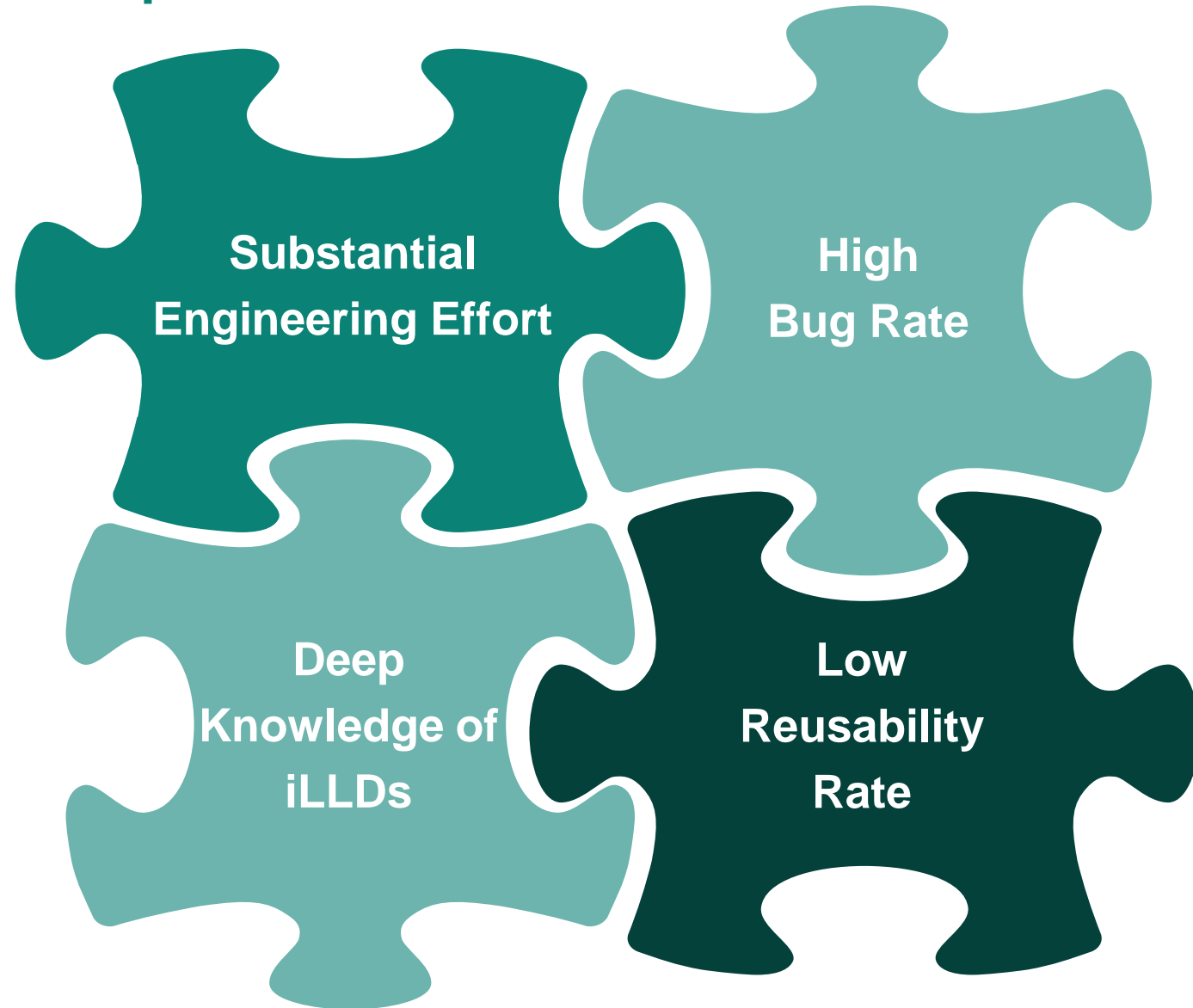


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Solution: Model-based SW Development

Vision:
Customer downloads a complete system with Infineon components, simulates and auto-generates SW

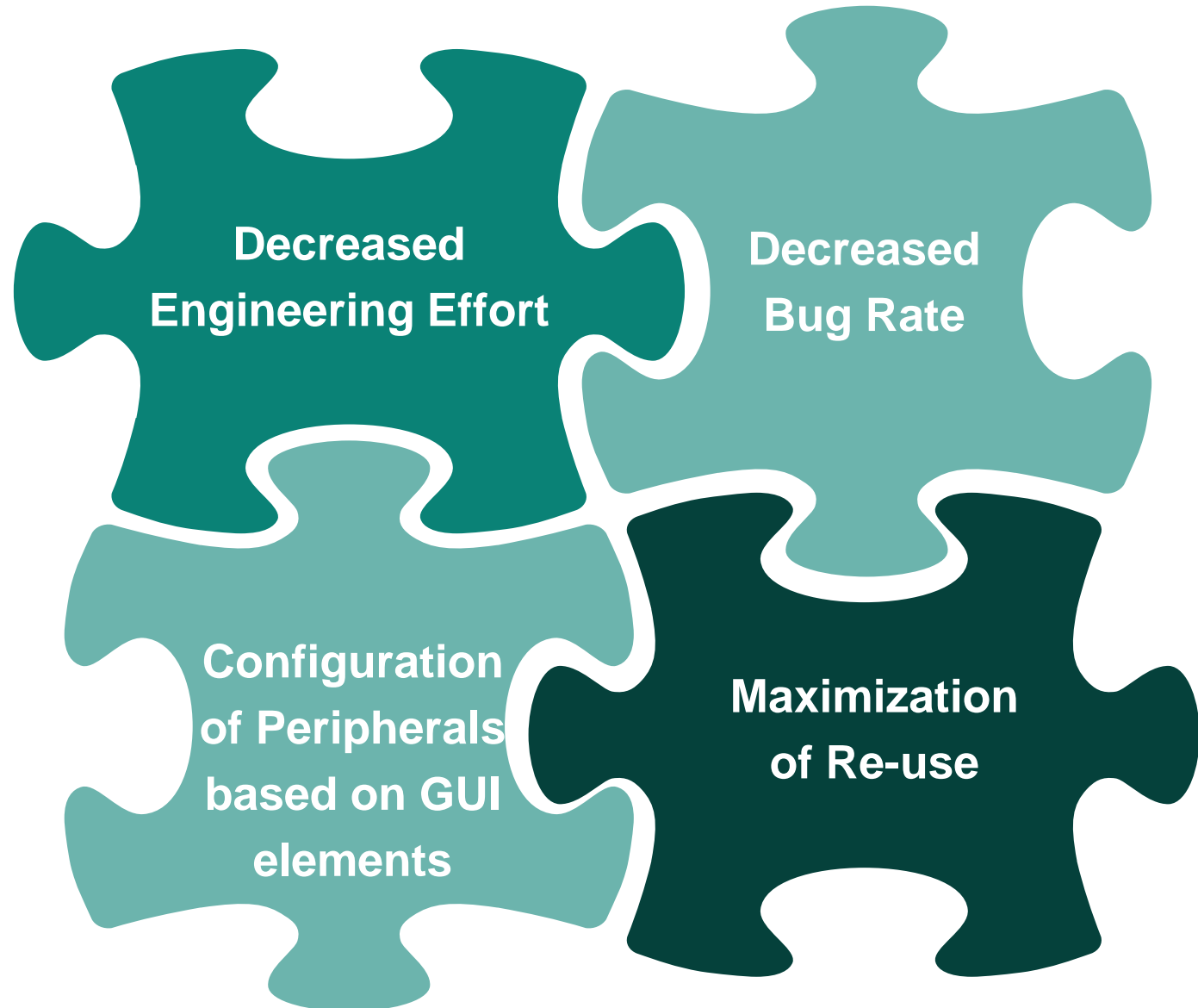
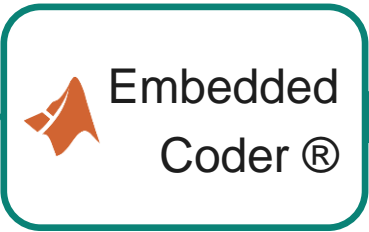
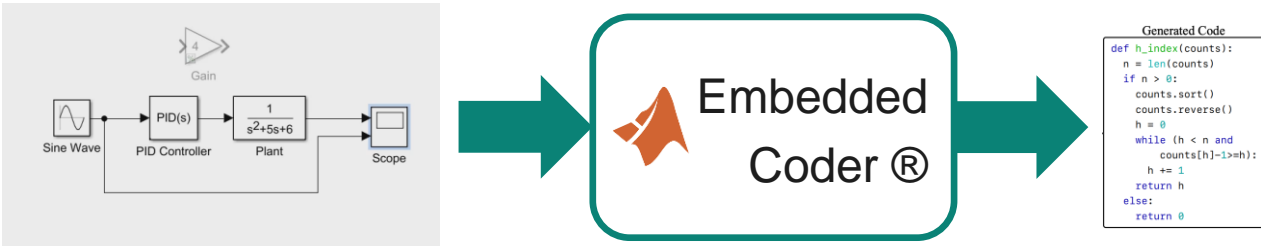


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How to use Matlab Extensions to develop Software for AURIX™ TC4x



```

Generated Code
def h_index(counts):
    n = len(counts)
    if n > 0:
        counts.sort()
        counts.reverse()
        h = 0
        while (h < n and
               counts[h]-1>=h):
            h += 1
        return h
    else:
        return 0
    
```

What is Embedded Coder ?

- efficient C/C++ code
- AUTOSAR, MISRA C ®
- **code is portable** and can be compiled and executed **on any processor**



What is SoC Blockset ?

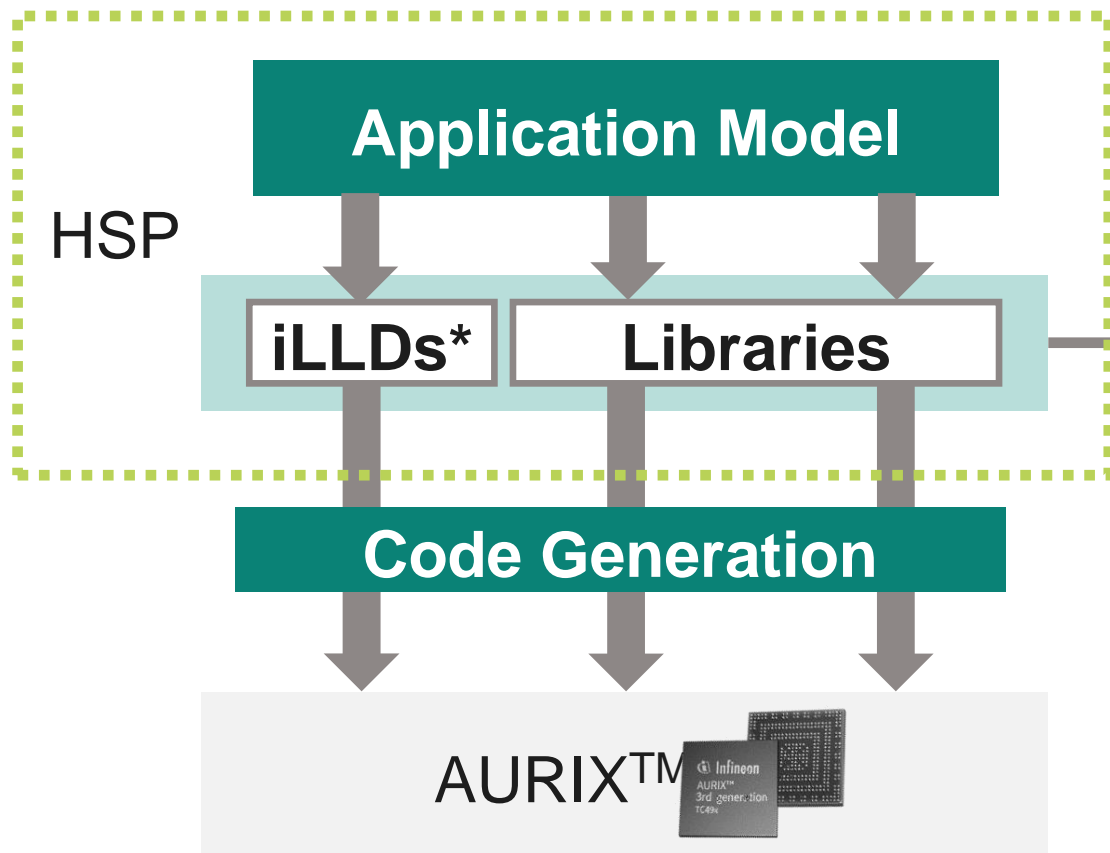
- enables simulation and analysis of the performance of **algorithms on multicore SoC**
- **assists the code generation** for the target SoC

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What is TC4x Hardware Support Package (HSP)

MATLAB/ Simulink Environment



Before HSP

- Embedded Coder translates Simulink model into C code
- Manual coding required

Highly time consuming & error prone

AURIX™ HSP

- Embedded Coder translates Simulink model into optimized C code
- Translates Simulink models into executable code
- Generated Code Optimized for AURIX™ TC4x
- Support for new peripherals added successively in new releases

*iLLD – Infineon Low Level Drivers

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AURIX™ Software Development Ecosystem

TC4x HSP

- TC4x HSP is developed under partner model
- Collaboration with MathWorks

- Half yearly release cycle together with MATLAB, Simulink products
- Based up TC4x iLLDs



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Embedded Software Development Landscape for AURIX™ TC4x

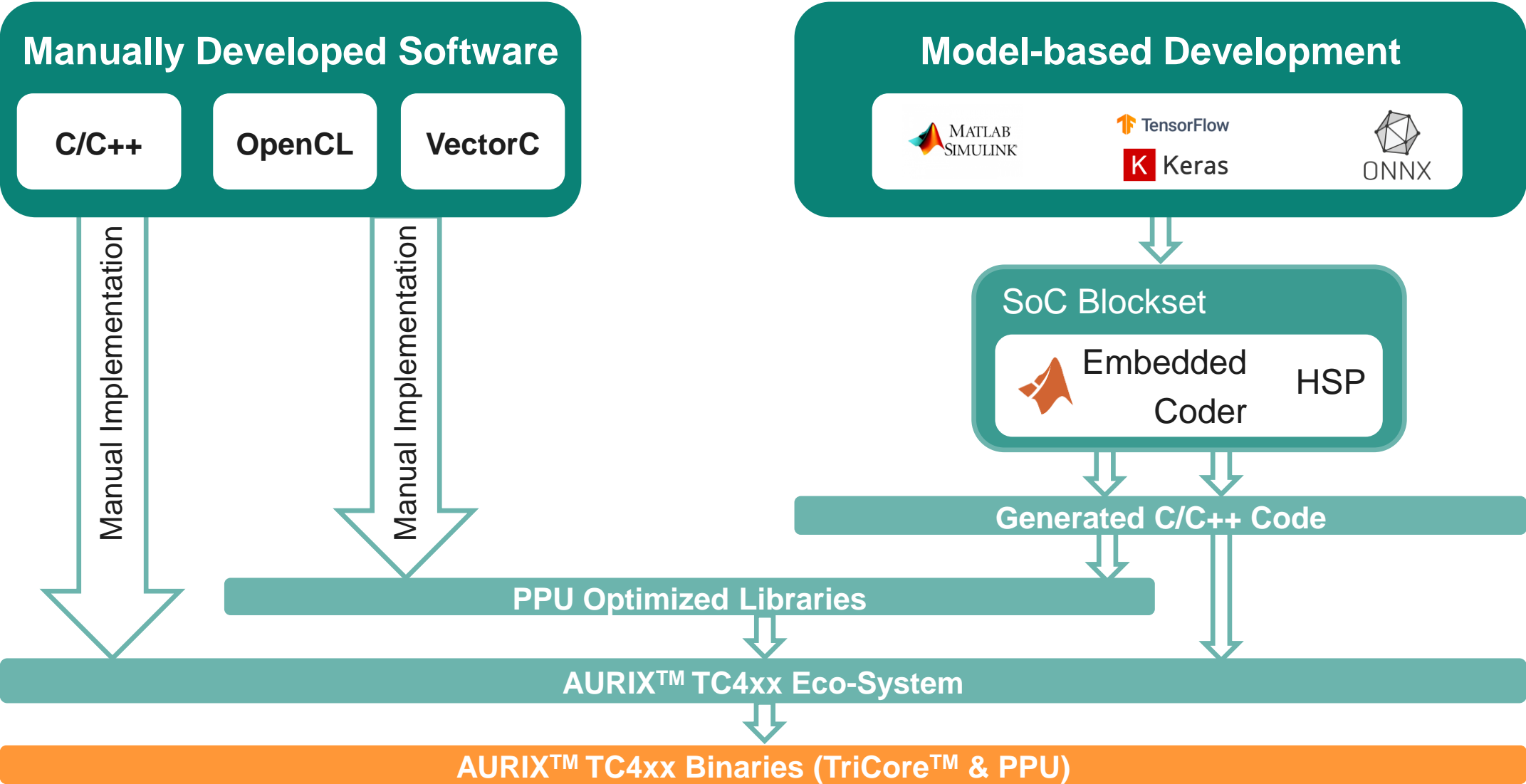
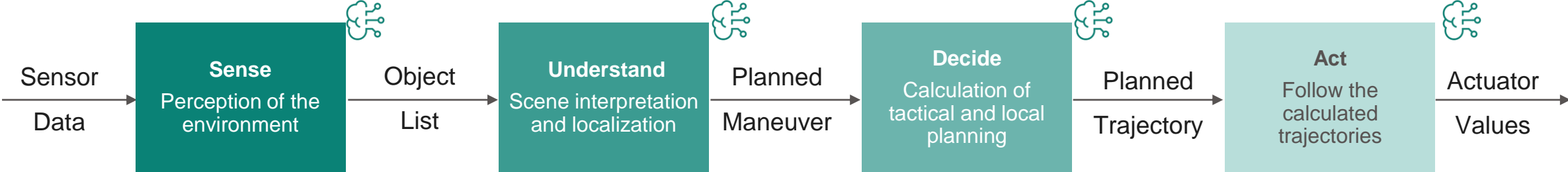


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Example: Embedded-AI in the context of autonomous driving

AI Enhanced vehicle motion with AURIX™ TC4x is driving a test vehicle

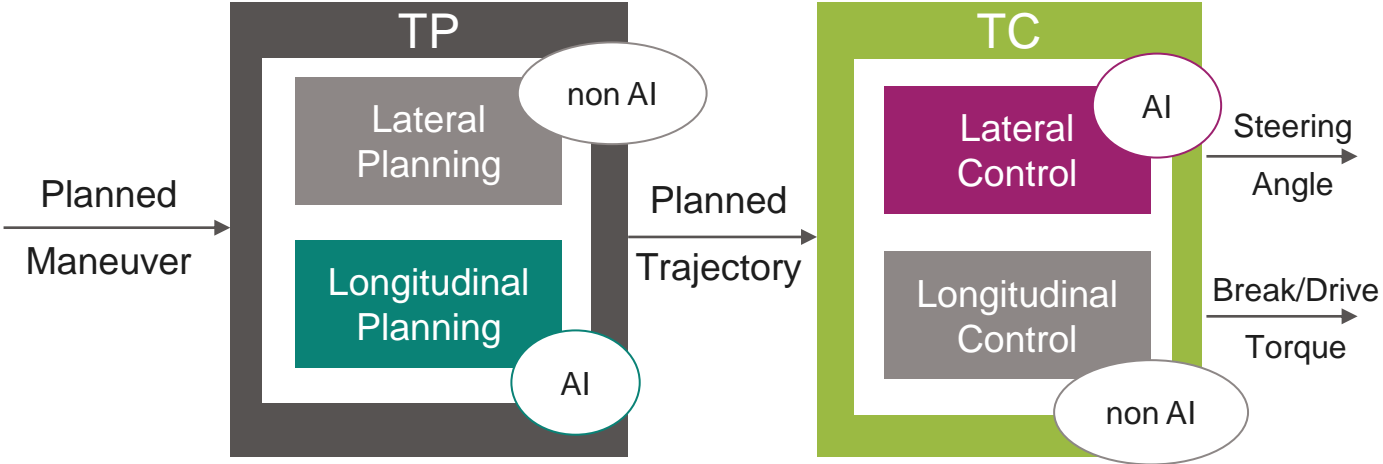


AI in perception and scene understanding already common!

AI to complement and enhance Trajectory Planning and Control is the step to improve driving comfort and energy efficiency

AI enhanced Trajectory Control (TC) increased the tracking accuracy by 50%

Trajectory Planning (TP) with AI enhanced Model Predictive Control (MPC) increases the energy efficiency for an ACC by up to 10%



Partitioning of the Application using Mathworks Embedded Coder and SoC Blockset for AURIX™ TC4x

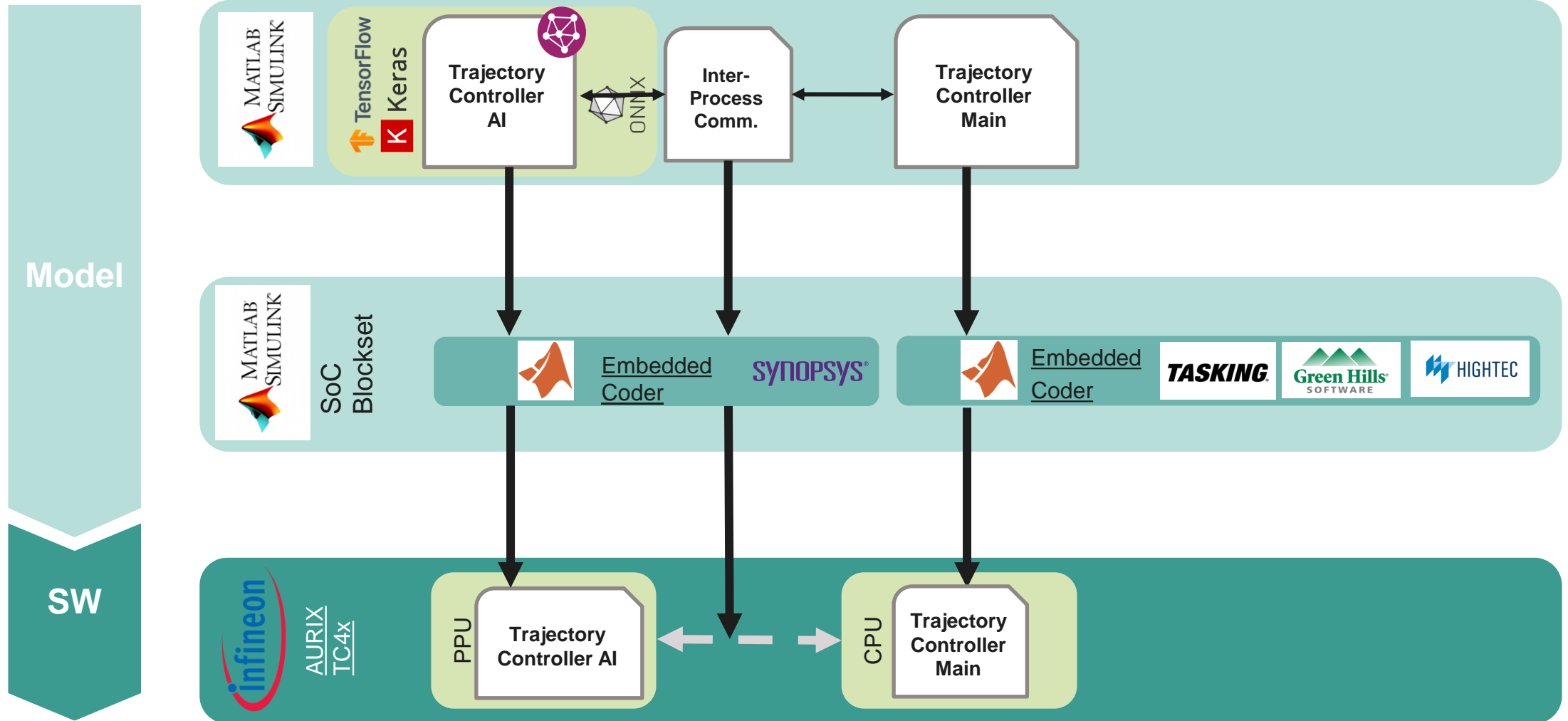


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Model-based SW Development Example

PPU Part
(NN Tuner)



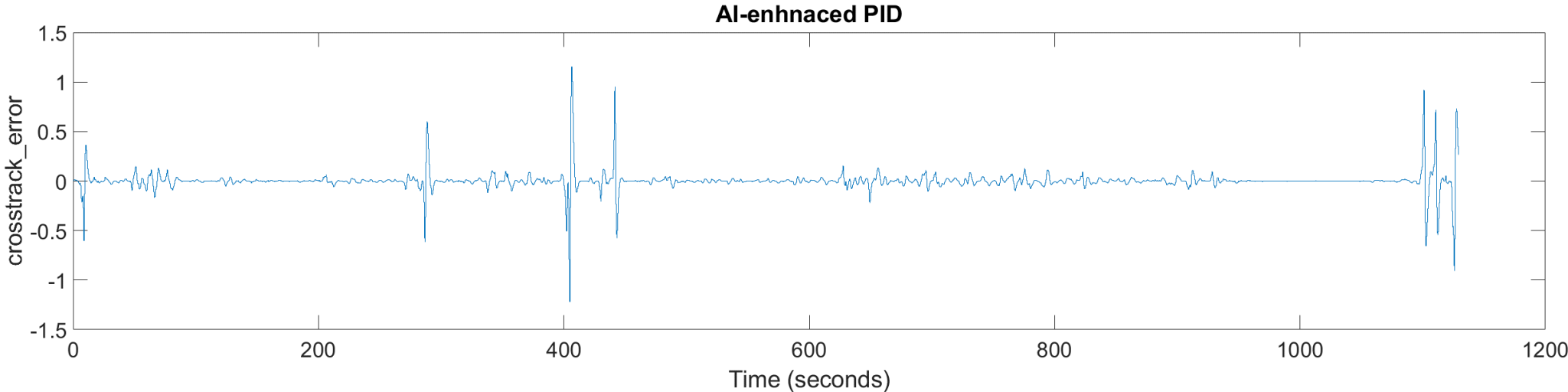
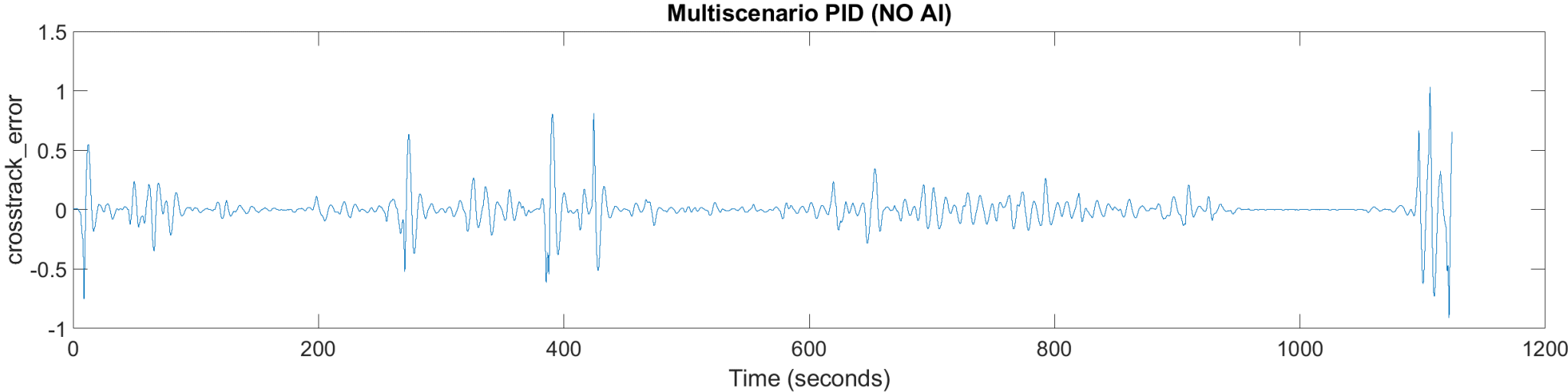
Schedule Task
for CPU0

IPC between
Tricore and PPU

Schedule Task
for PPU

AI-Enhanced PID Controller Outperforms Baseline Controller

Result
Training
Test
Test
KPI
Acceleration



zation

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Summary



– SoC Blockset for **AURIX™ TC4x** enables code generation and software built for **multi-core applications including PPU**



– Model driven development **maximizes Re-use of existing projects and decreases the engineering effort**



– IFX offers complete ecosystem for **model driven development** and close-loop validation on different abstraction levels

