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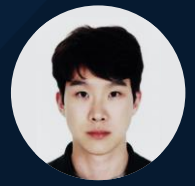
AUTOMOTIVE
CONFERENCE 2024
Korea

MATLAB/Simulink를 활용한 Mobilgene 플랫폼 기반 차량용 공조 제어기 SW CI 환경 구축

Establishment of SW CI environment for ATCU based on HAE Mobilgene & MATLAB Simulink

허승준 책임 연구원, 현대위아



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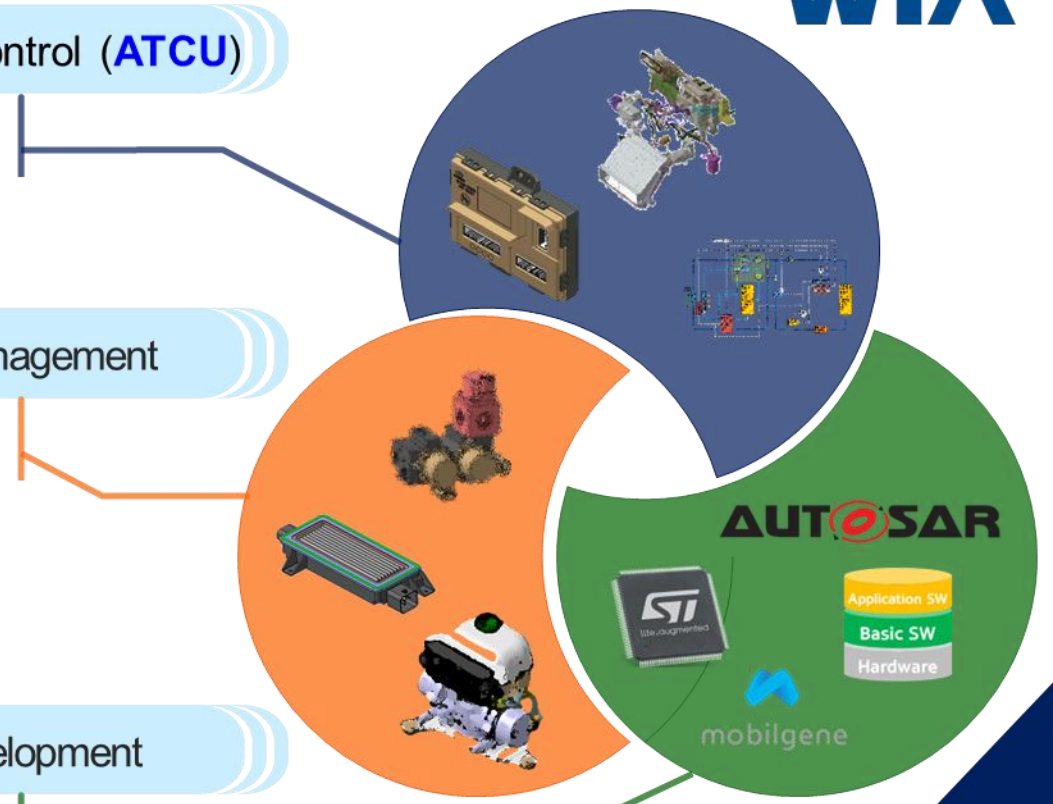
Introduction about Hyundai-WIA ATCU

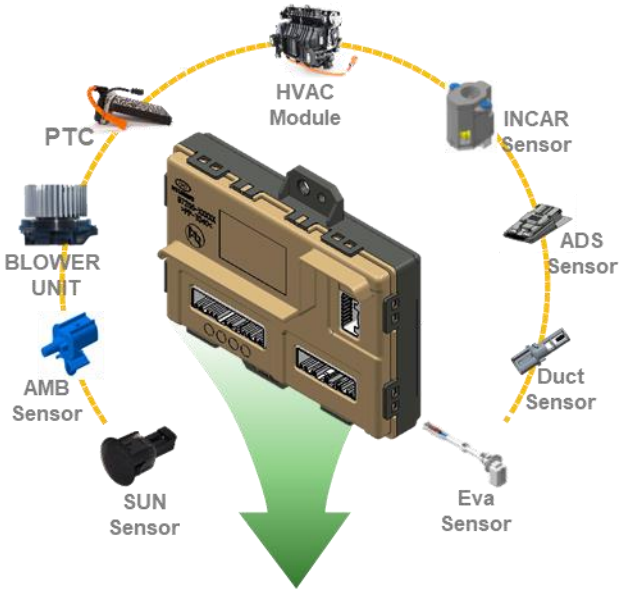
About Hyundai-WIA TMS Control

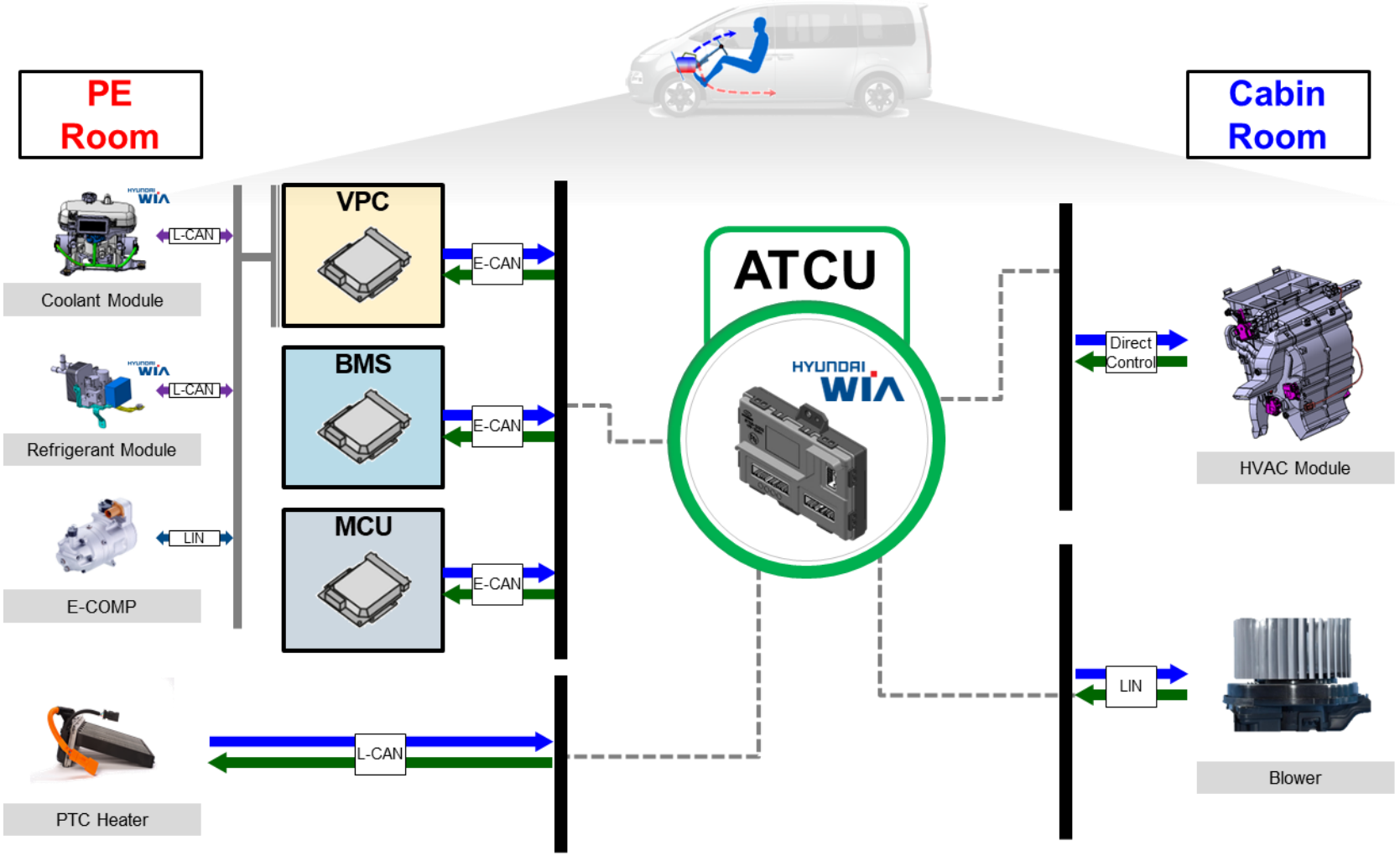
- Auto Temperature Control (**ATCU**)
- PE Room Thermal Management
- Platform Software Development



Introduction about Hyundai-WIA ATCU

ATCU : Auto Temperature Control Unit



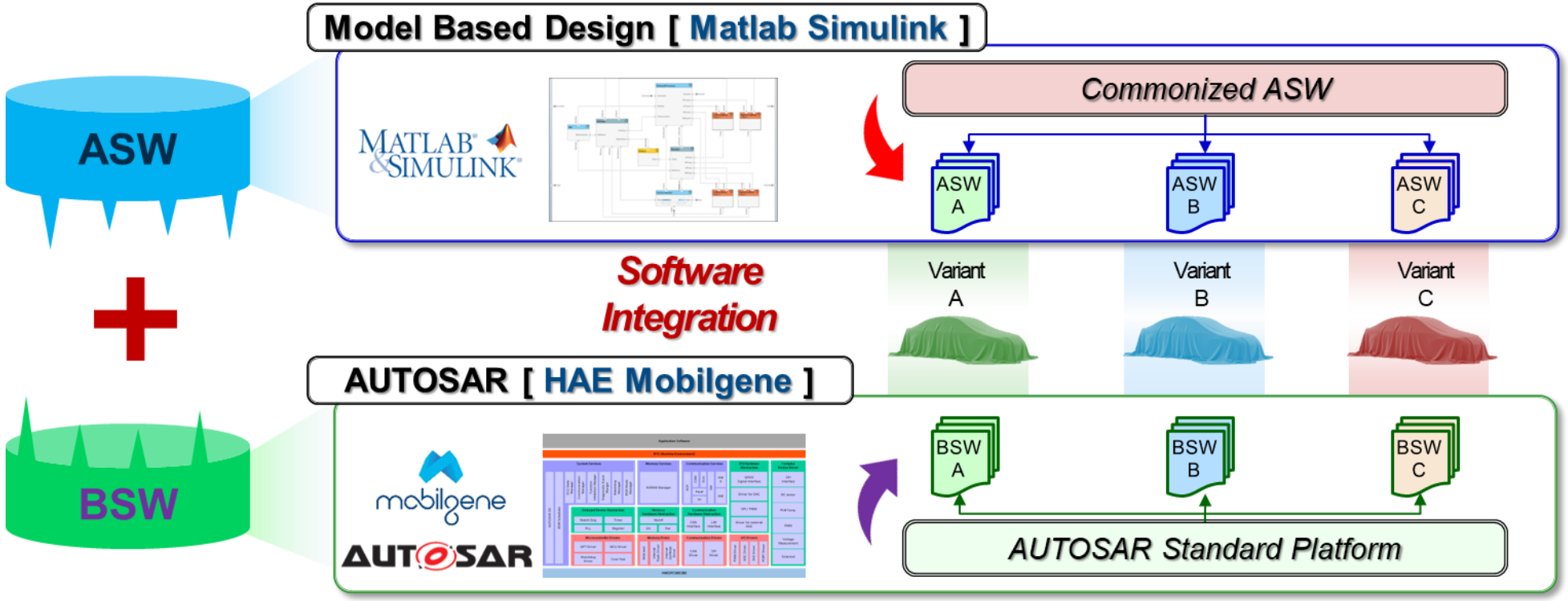


Hyundai-WIA's ATCU Project Goals

ATCU Project : Challenge Points

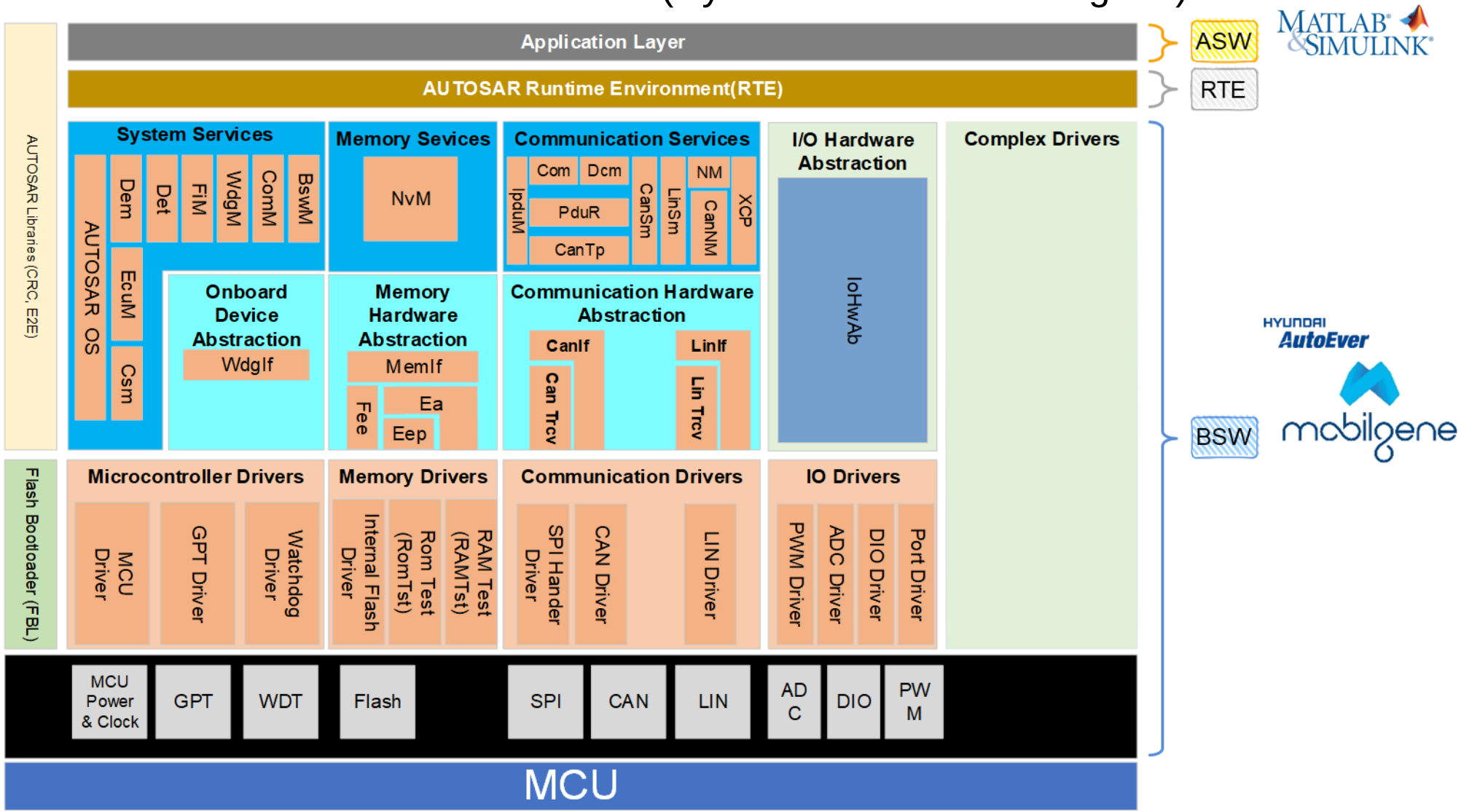
Model Based Design (MBD) ASW + AUTOSAR BSW

- ▣ Commonized software development via MBD + AUTOSAR
- ▣ Improved Development Speed and Efficiency for ***Partial Modifications***



Software architecture of Hyundai-WIA ATCU

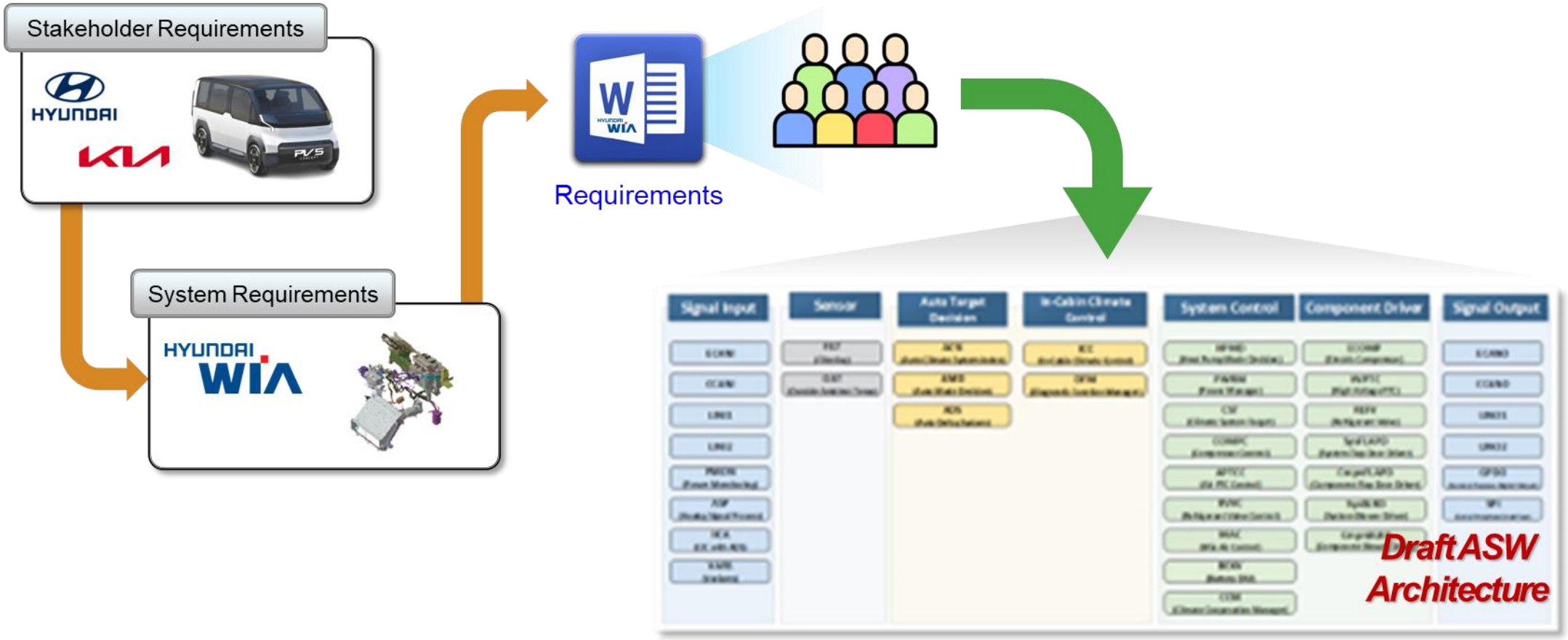
BSW : HMC Classic AUTOSAR Platform (Hyundai AutoEver Mobilgene)



Software architecture of Hyundai-WIA ATCU

ASW : Software architecture

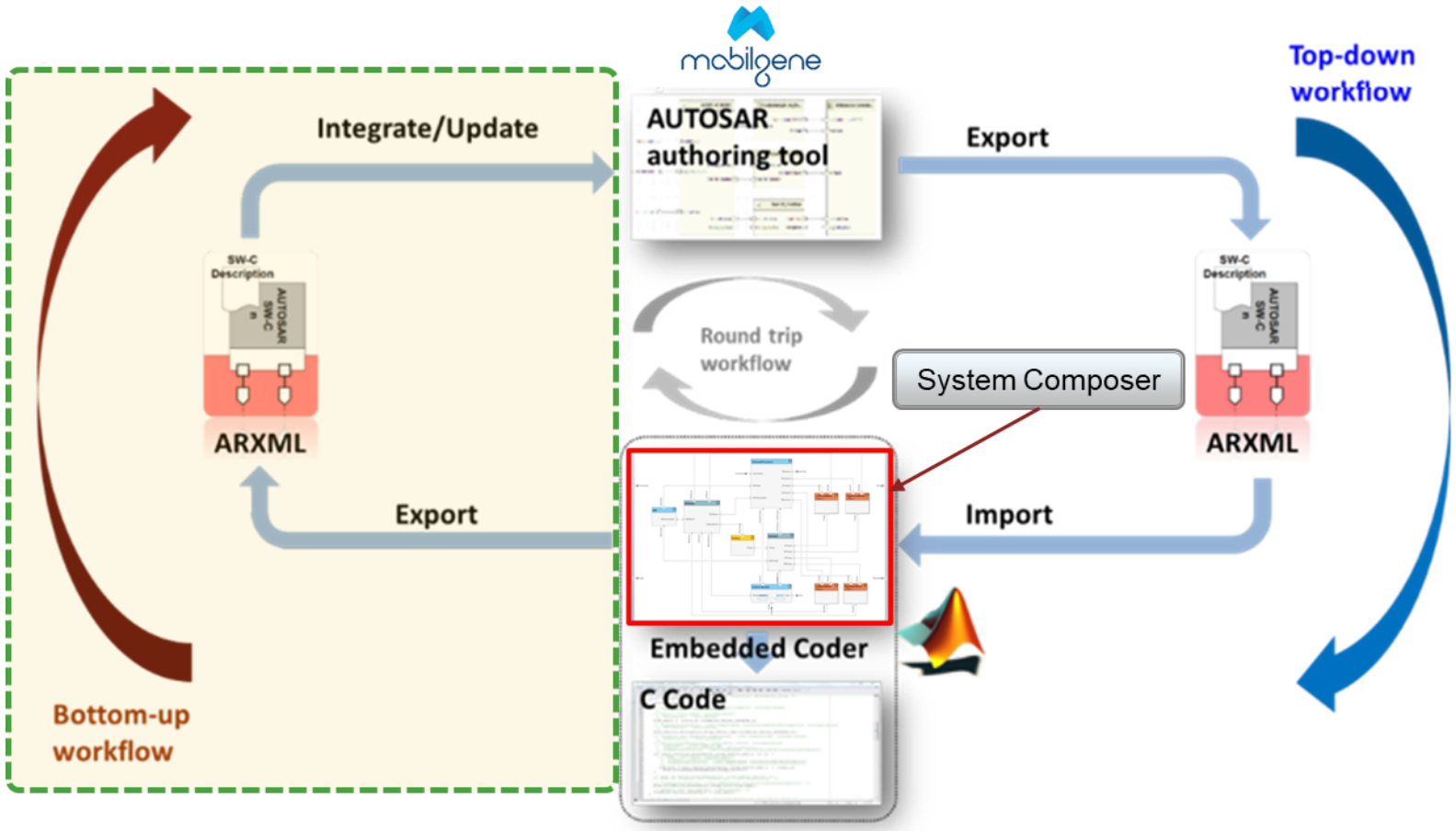
Draft ASW Architecture : 7 EA Compositions / 37 EA Components



Software Integration Workflow– In the **Early** Stage

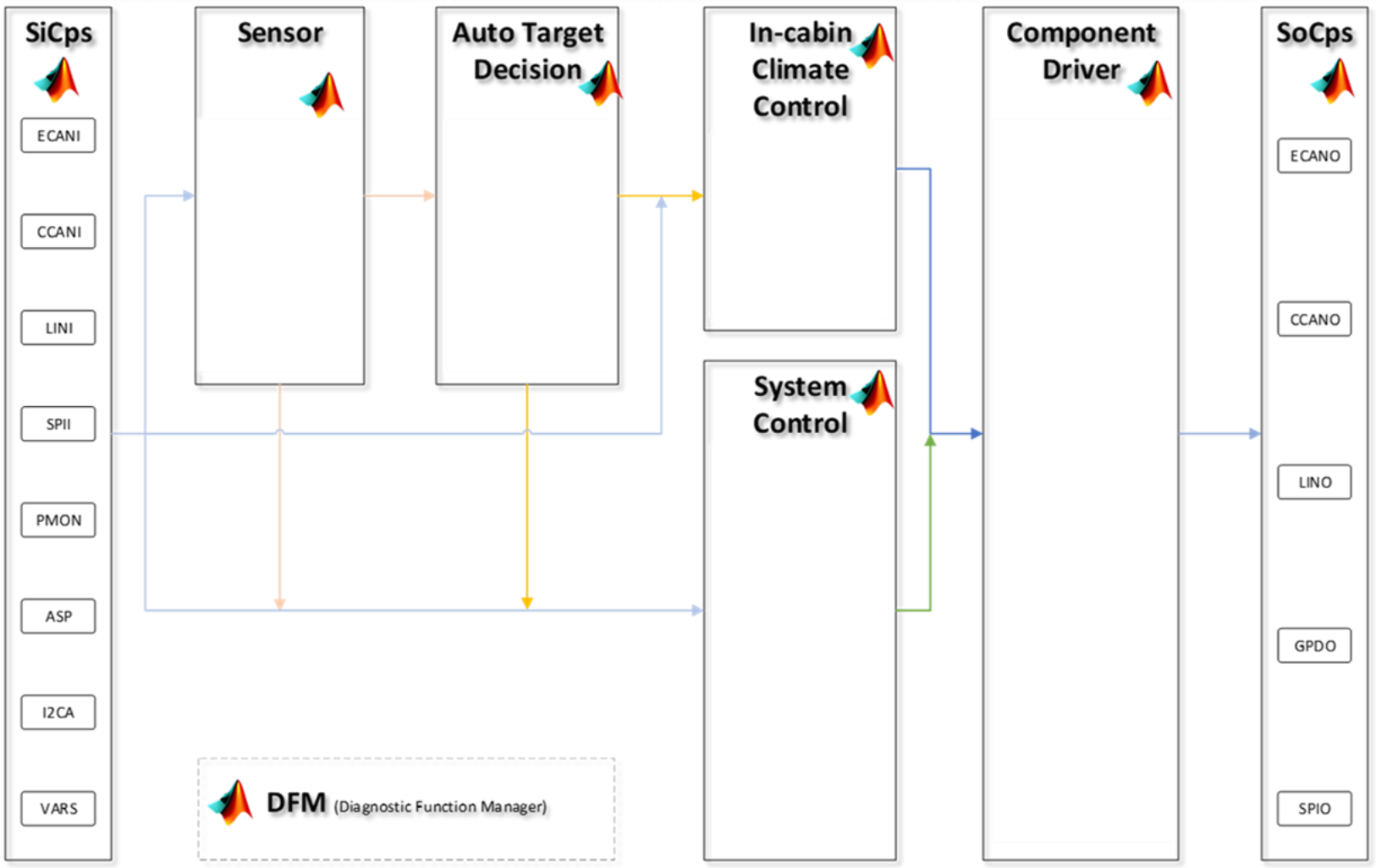
ASW + BSW Software Integration

Try Bottom-Up Workflow via Simulink System Composer



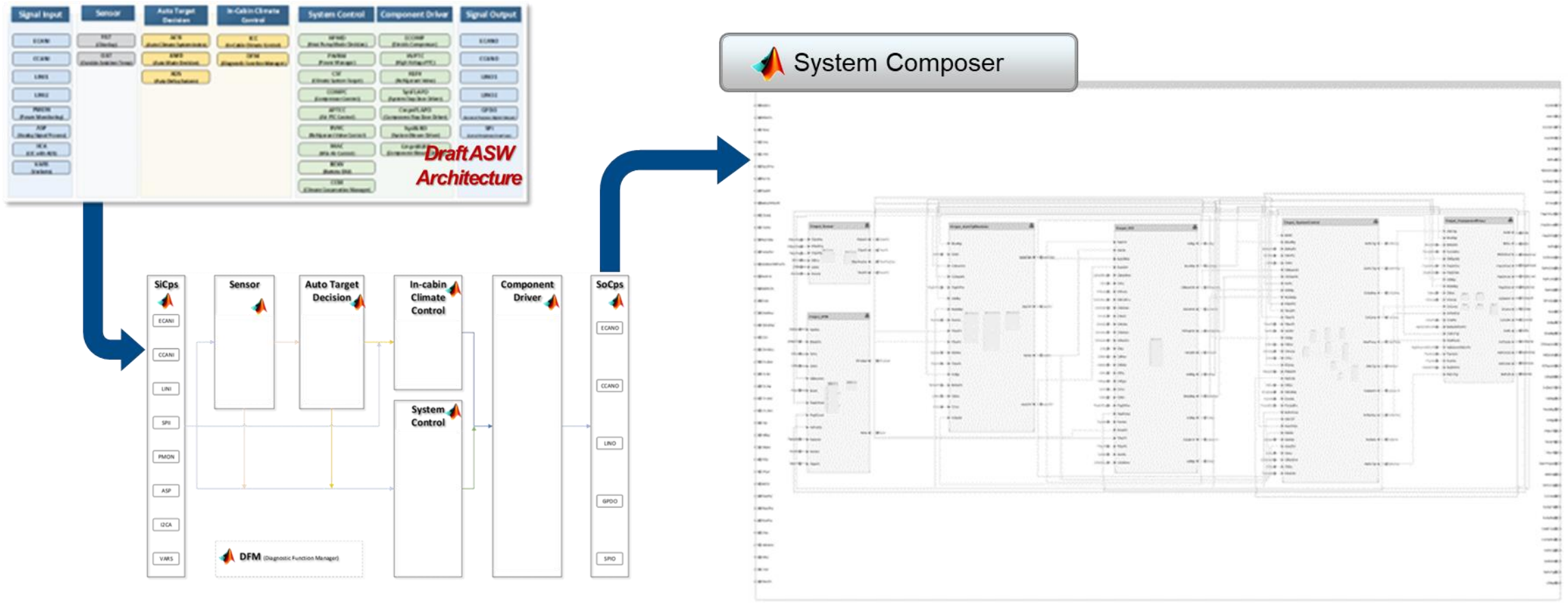
Software Integration Workflow– In the **Early** Stage

Embody Application Software architecture



Software Integration Workflow– In the **Early** Stage

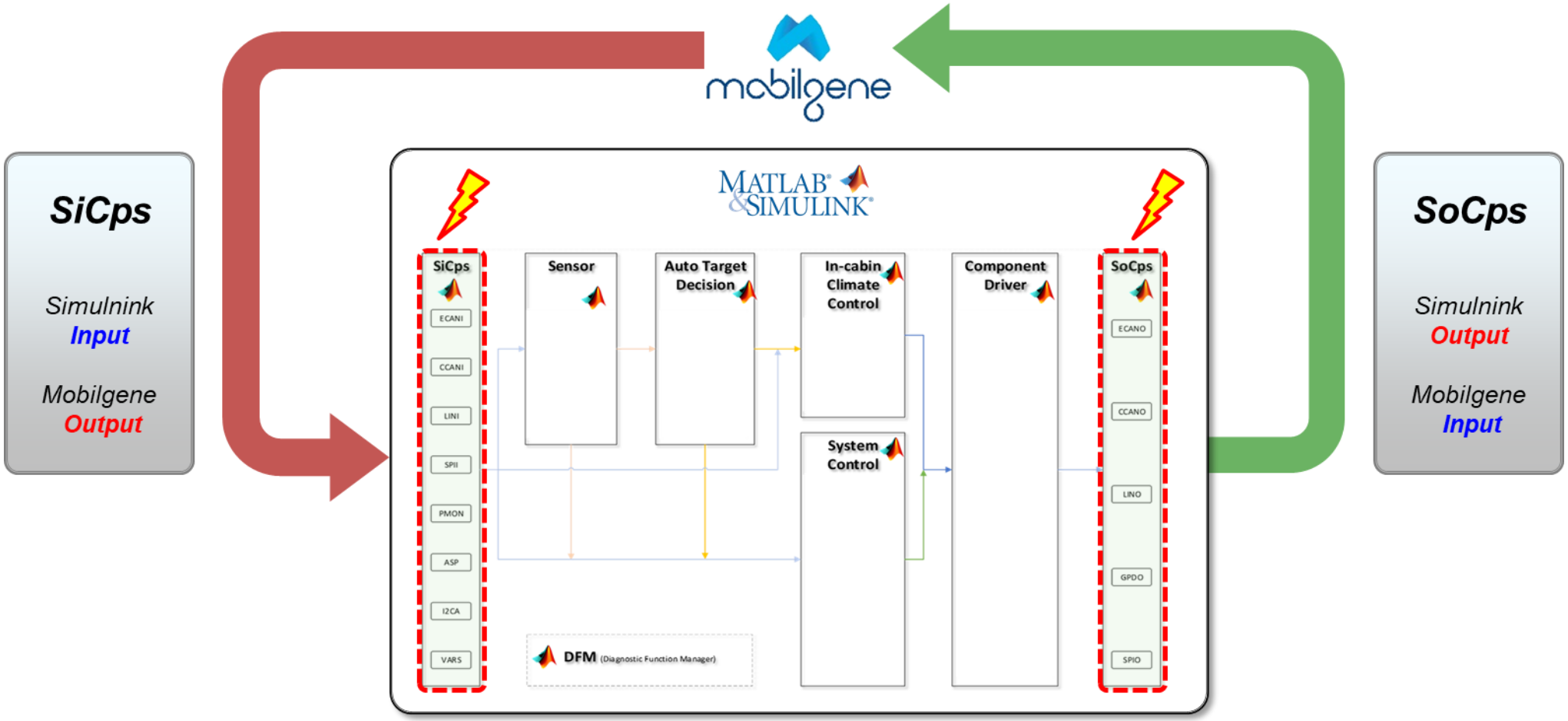
Application Software Architecture Design with System Composer



Software Integration Workflow– In the **Early** Stage

Attempt at Software Integration via Bottom-Up Workflow

Interface Mismatch between Simulink and Mobilgene



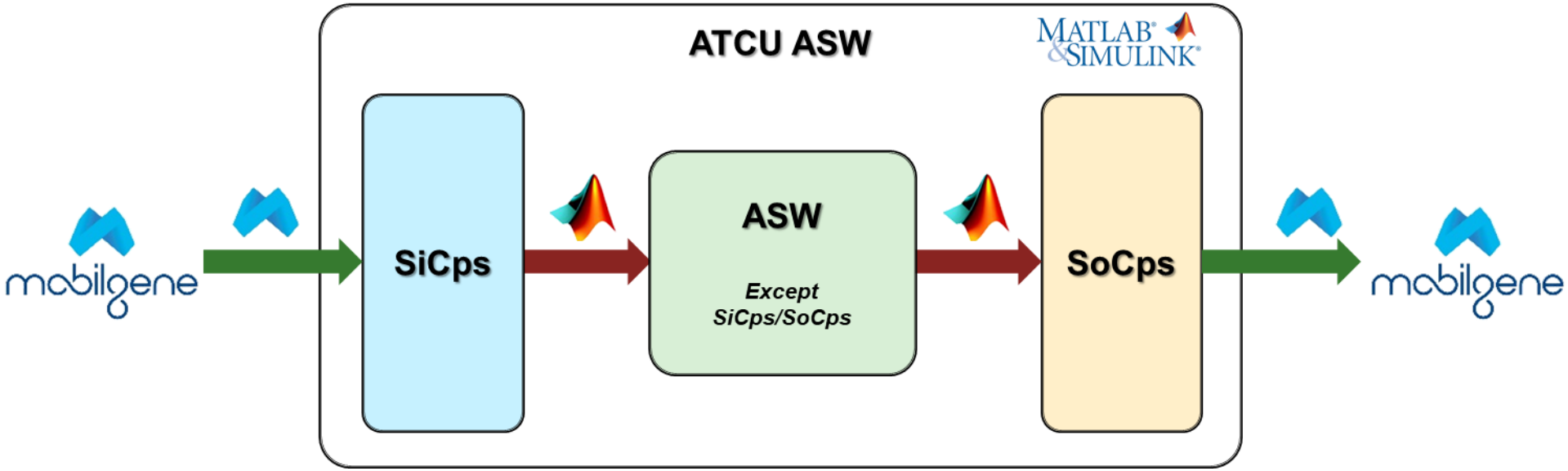
Software Integration Workflow– In the **Early** Stage

Attempt at Software Integration via Bottom-Up Workflow

To Solve the Mismatch Problem….

1. Match Interface properties (Especially, Interface Package)

2. Separate interface properties SiCps/SoCps SWC Input & Ouput



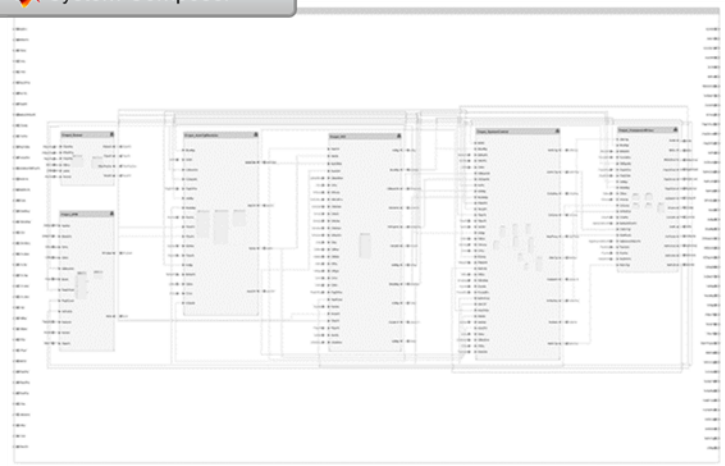
Software Integration Workflow– In the **Early** Stage

Attempt at Software Integration via Bottom-Up Workflow

Improvement Method

1. Match Interface properties (**Especially, Interface Package**)
2. Separate interface properties SiCps/SoCps SWC Input & Output

System Composer



Review whether the improvement method is applicable via System Composer directly (Auto-code/arxml generation)

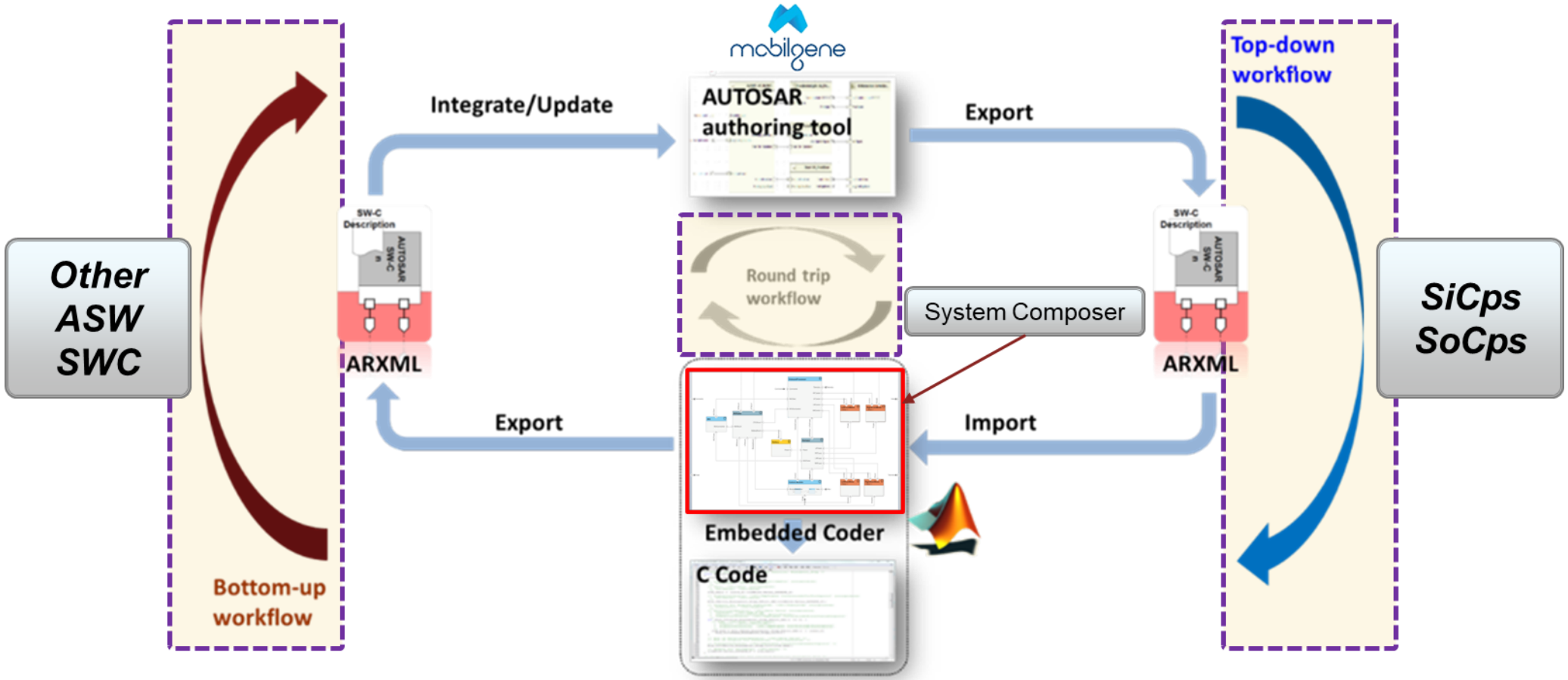
- Additional Pre/Post-processing is needed
- Ensuring Flexibility in ASW development

Change Software Integration Workflow Temporarily!!

Software Integration Workflow– In the **Middle** Stage

ASW + BSW Software Integration

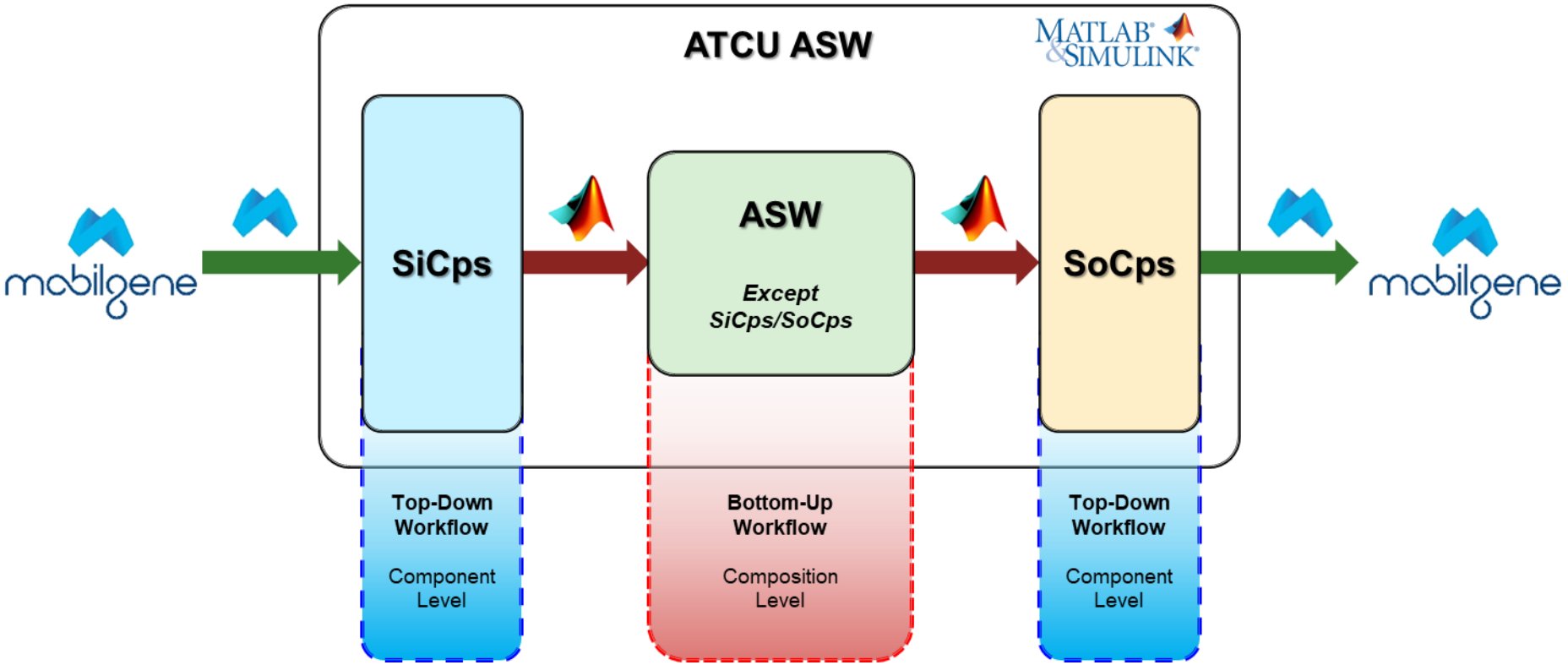
Try **Round Trip Workflow** via Simulink System Composer & Mobilgene



Software Integration Workflow– In the **Middle** Stage

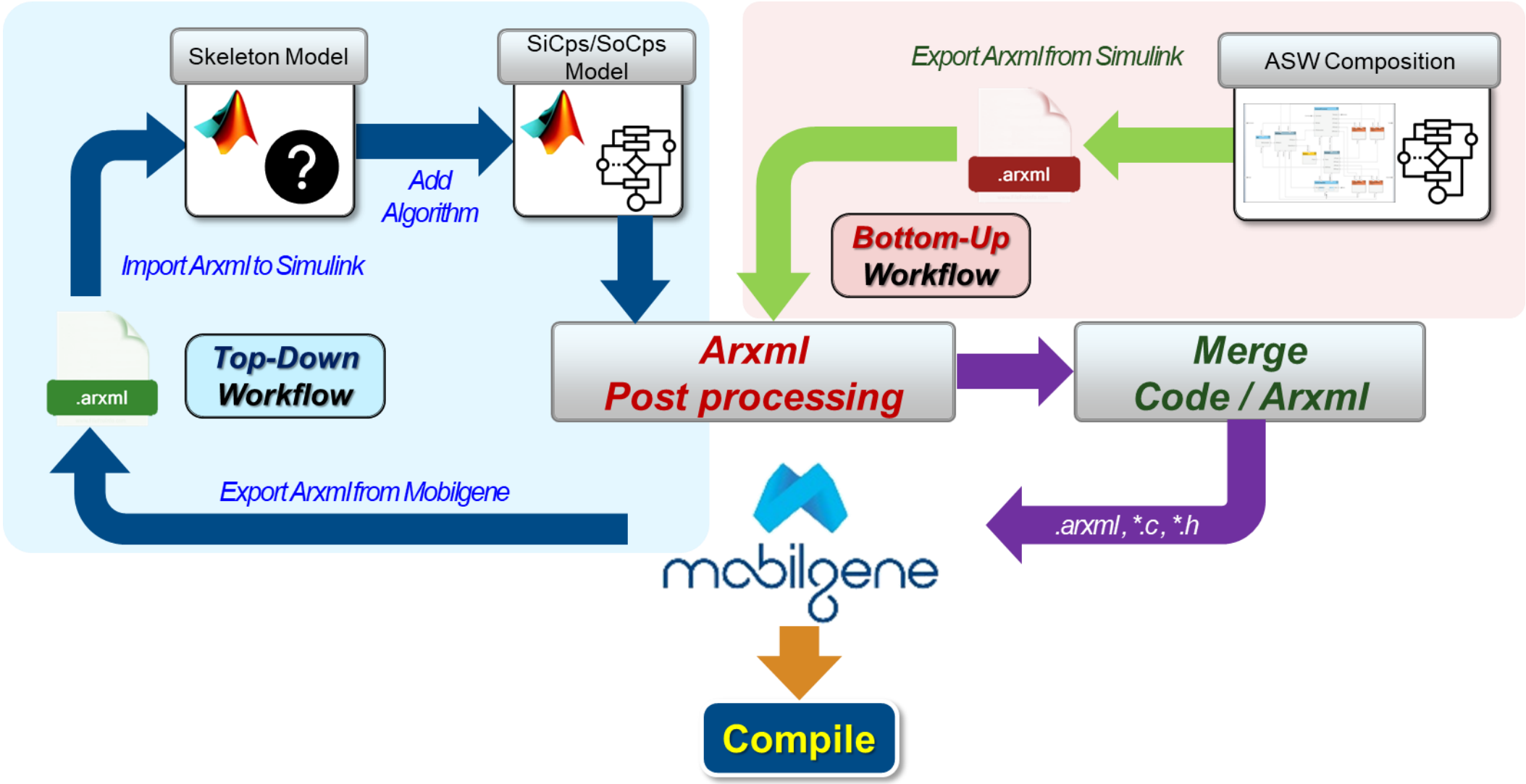
Attempt at Software Integration via Round Trip Workflow

Workflow	Applied ASW	Integration Unit	Mobilgene Fixed Interface
Top-Down	SiCps	Components	SiCps SWC **Input**
Top-Down	SoCps	Components	SoCps SWC **Output**
Bottom-Up	Except SiCps/SoCps	Composition	-



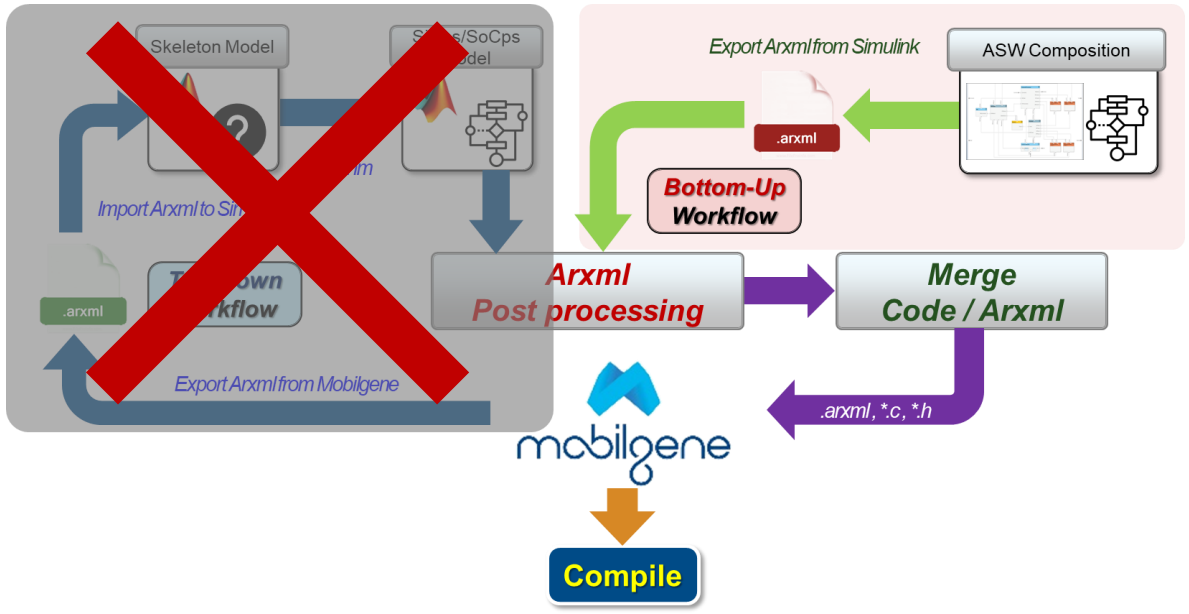
Software Integration Workflow– In the **Middle** Stage

Round Trip Integration Workflow Details



Software Integration Workflow– In the On-Going Stage

Constraints and Limitations Round Trip Workflow



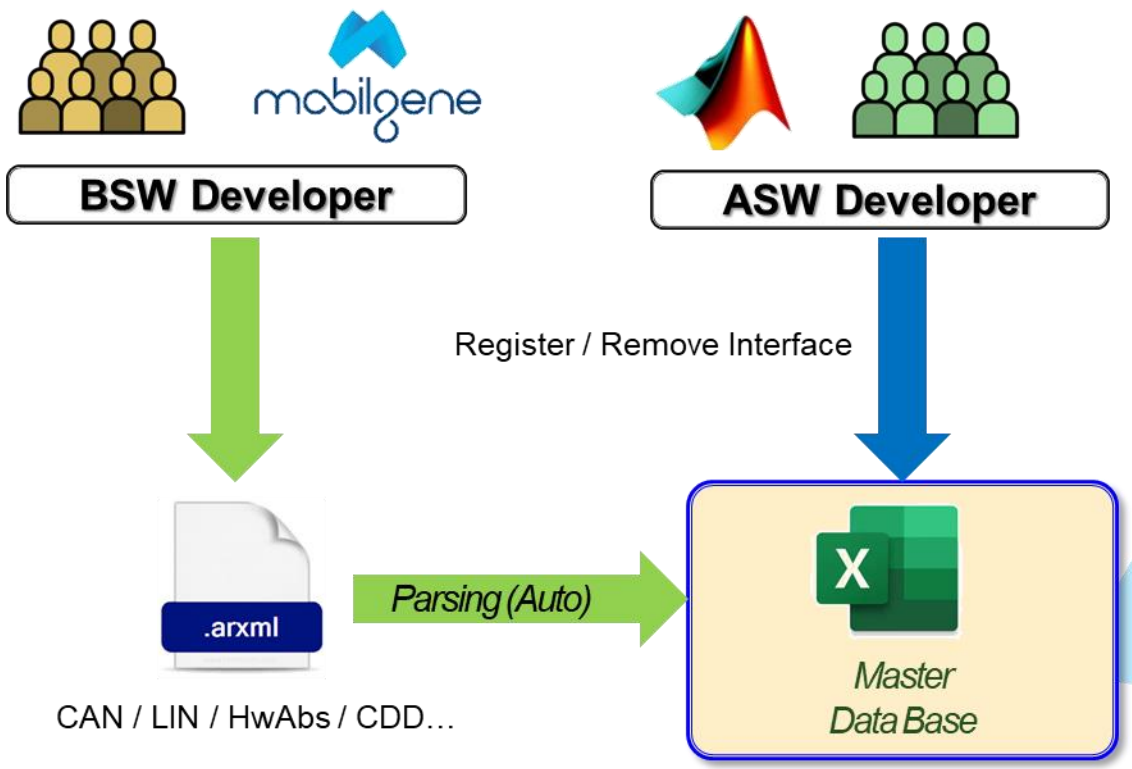
- High integration complexity
- ASW separation management required
  → **Unable to perform integrated MILS (Constrained & Partially)**
- SW Integrator and ASW developer might be separated.
- **SW C.I. implementation impossible**

Need a strategy to Get back to Bottom-Up Integration Workflow

Software Integration Workflow– In the **On-Going** Stage

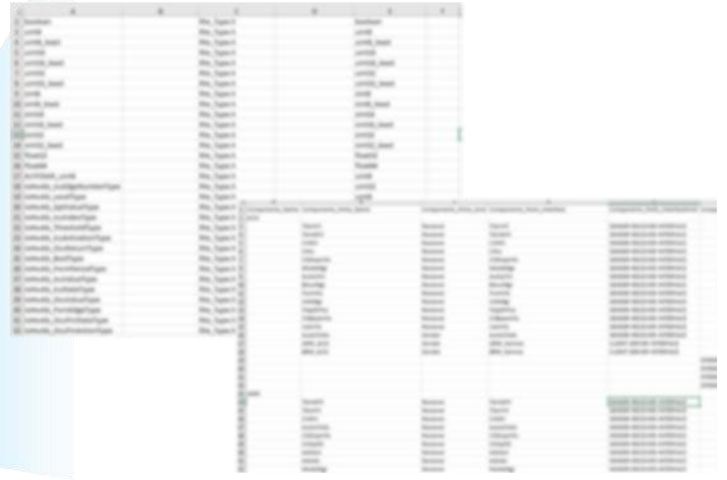
Concept of Master Data Base (MS Excel Based)

- ▣ Include All BSW + ASW Interface Properties
- ▣ Comprehensive management



▣ ***All of AUTOSAR Interface Properties***

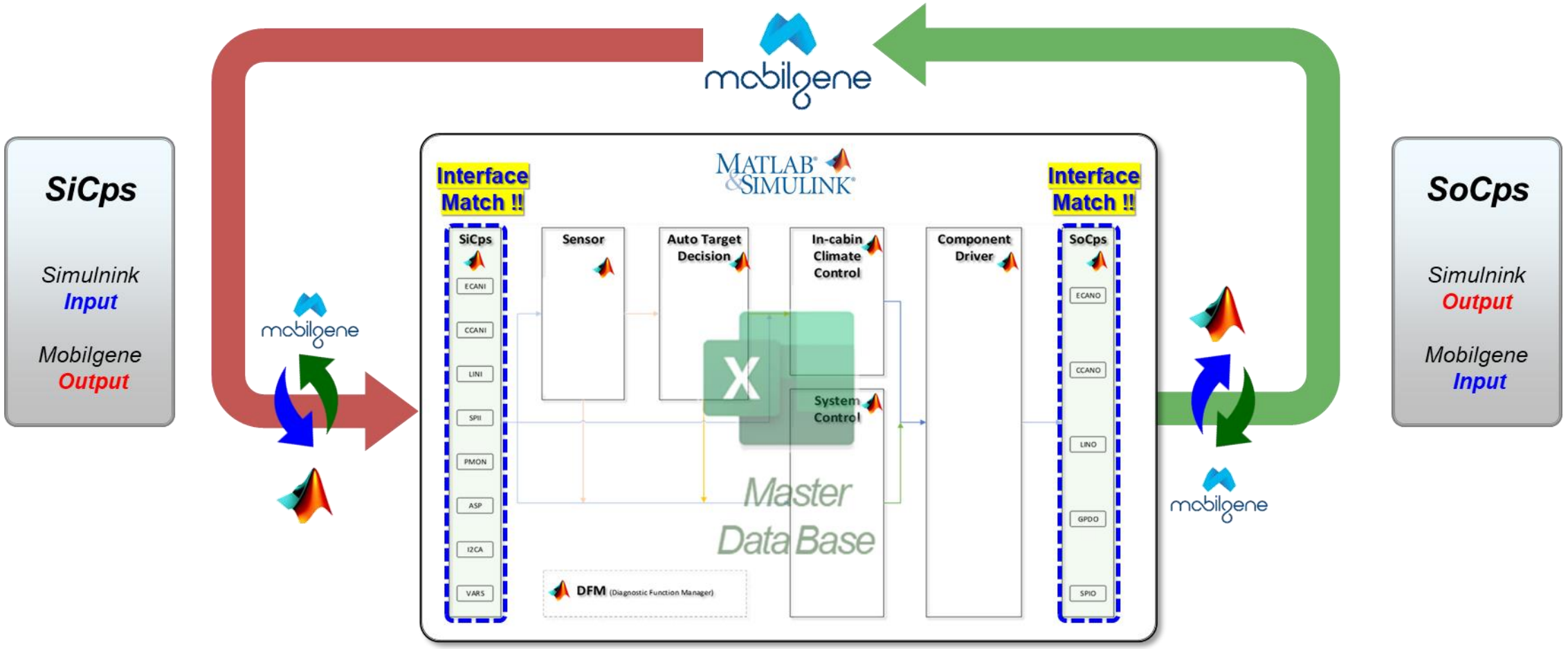
- *Data, Alias, Enum Type Info …*
- *Components, Composition Interface …*



Software Integration Workflow– In the On-Going Stage

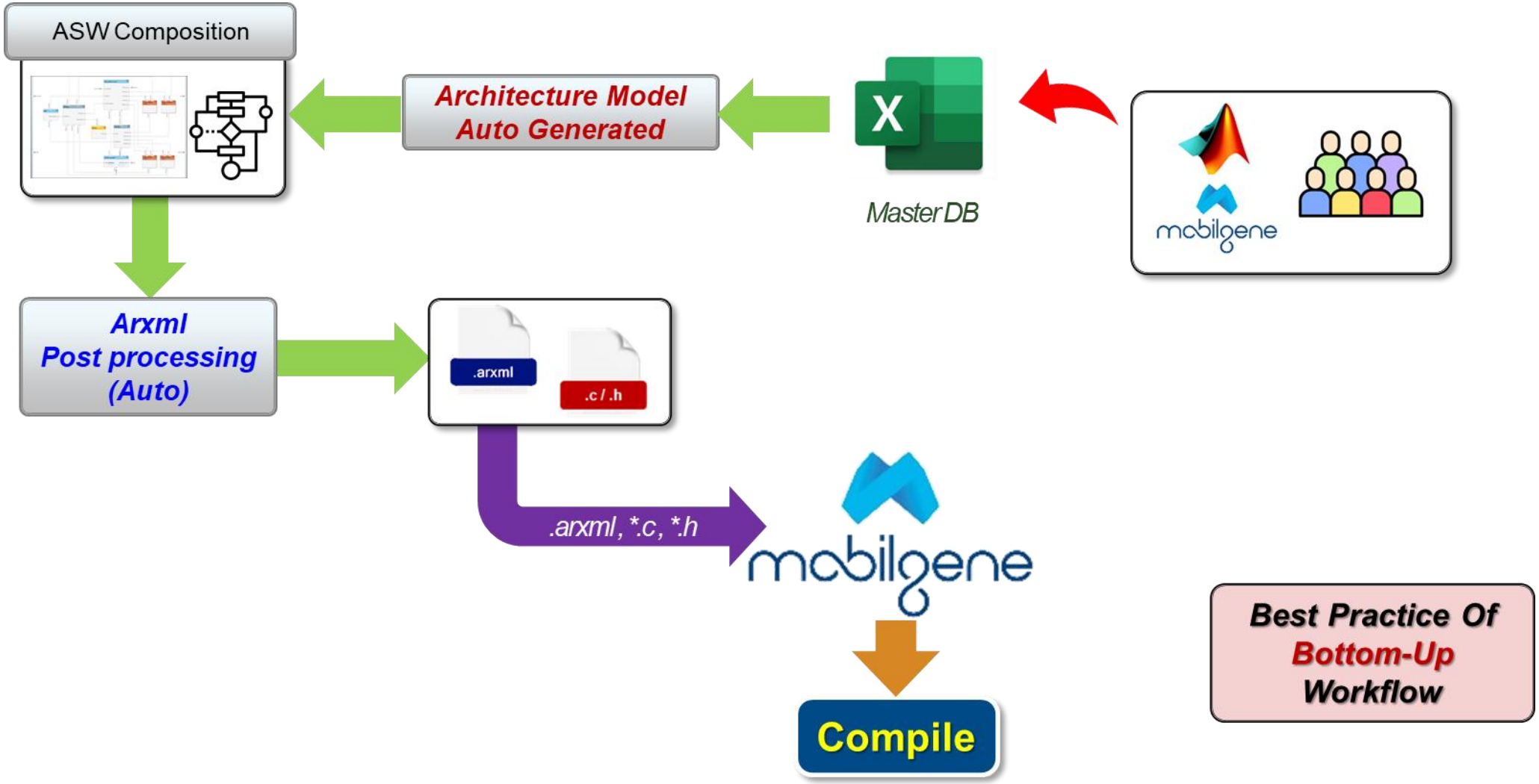
Bottom-Up Software Integration Workflow via Master DB Using Concept

Interface Match between Simulink and Mobilgene



Software Integration Workflow– In the On-Going Stage

Bottom-Up Integration Workflow via Master DataBase

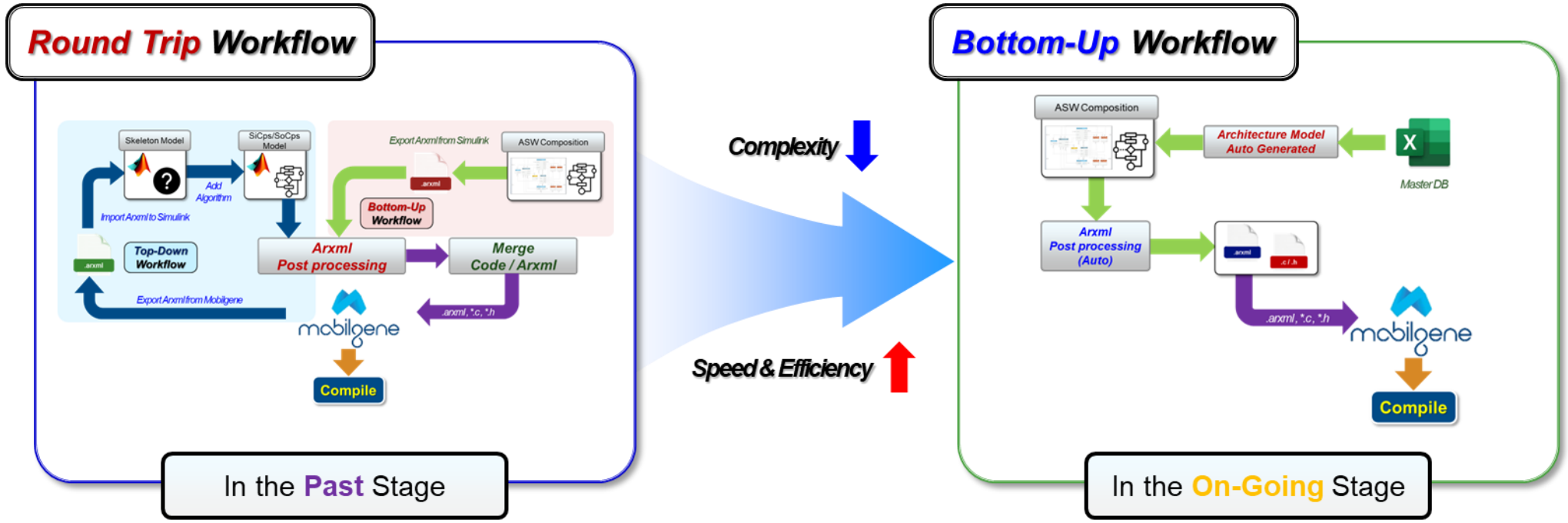


Software Integration Workflow– In the On-Going Stage

Improved Integration Procedures

Simplify Integration Procedures

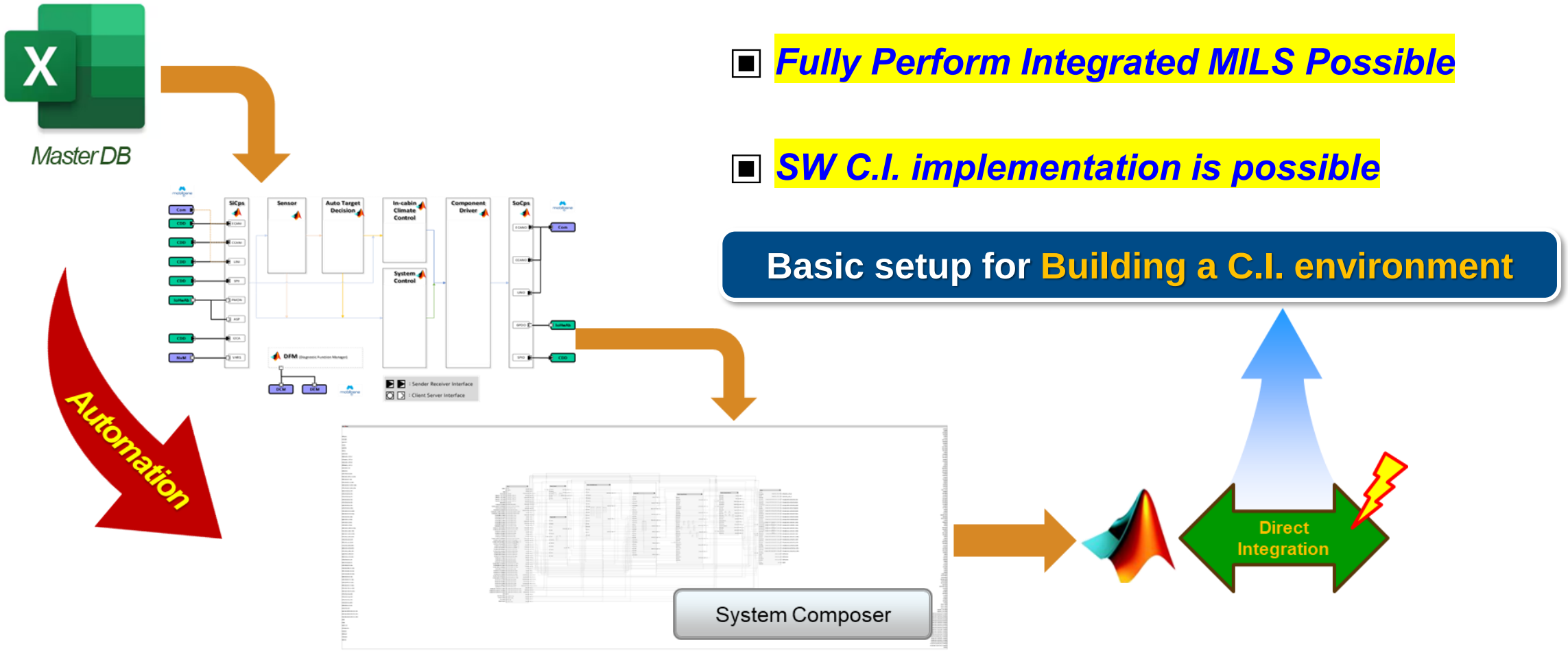
- ▣ Simplify Integration Procedures (Round Trip → Bottom-Up)
- ▣ Automate All ASW + BSW Integrated Procedures



Software Integration Workflow– In the On-Going Stage

Bottom-Up Integration Workflow

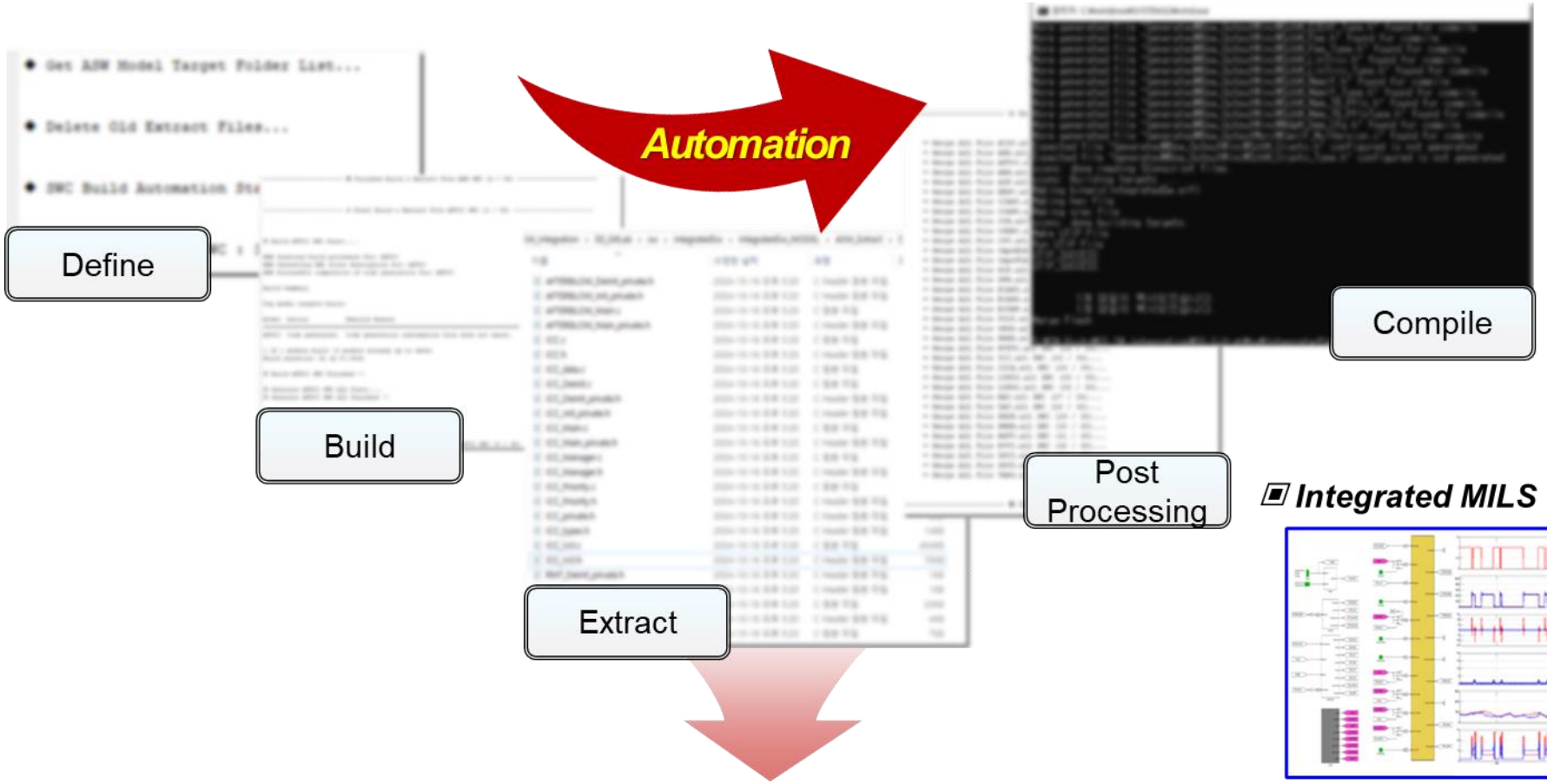
- ***Low Integration Complexity***
- ***Fully Perform Integrated MILS Possible***
- ***SW C.I. implementation is possible***



Basic setup for Building a C.I. environment

Software Integration Workflow– In the On-Going Stage

Continuous Integration via Bottom-Up Workflow



Increase Development Speed and Efficiency By Continuous Integration
(Based on Master DB / System Composer / Matlab Automation)

Future Plans About C.I. Environments

Expanding the C.I. Environment and Automating the entire process combined with 3rd party Tool

- Expanding the C.I. Environment and Automating the entire process combined with 3rd party Tool
- Tools under consideration : Codebeamer, JIRA, GitLab, JENKINS, **HILS, Virtual ATCU**…

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Thank you

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