SMART SAR

ECU软件的AUTOSAR开发方法

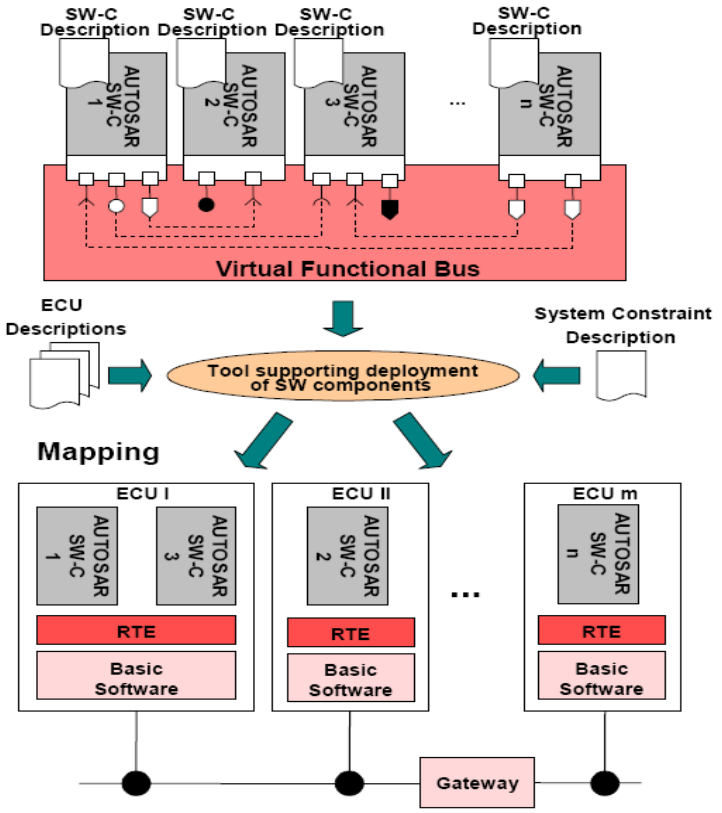
浙江大学ESE工程中心

Outline

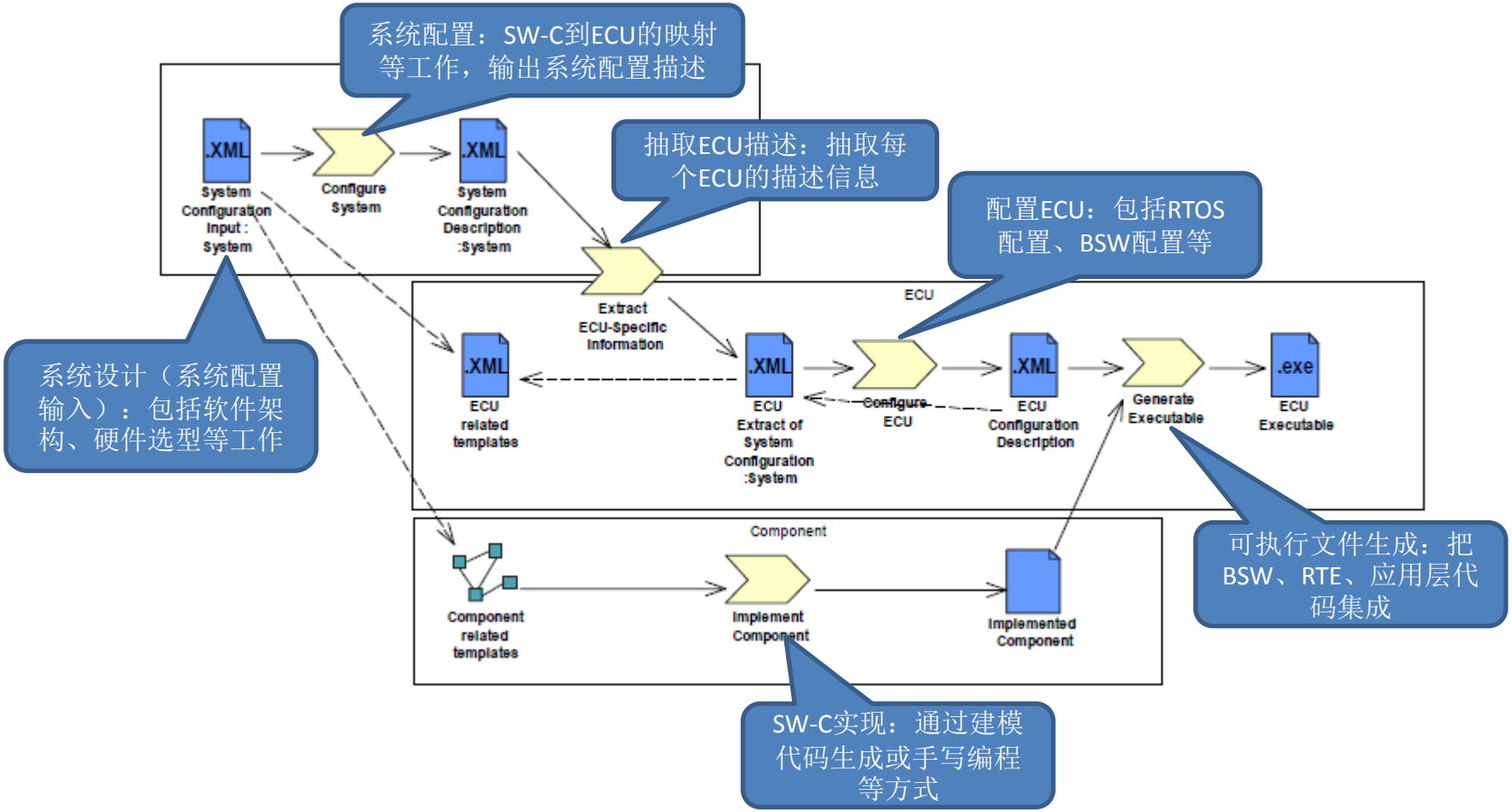
- 方法概述
- 系统设计
- 系统配置
- ECU配置
- 执行文件生成

AUTOSAR开发方法概述

- 应用层由各个SW-C设计组成
- 在VFB上可以验证SW-C间的接口一致性
- 利用工具进行系统配置、ECU配置、代码生成
- 支持整车电控系统设计



AUTOSAR开发方法概述



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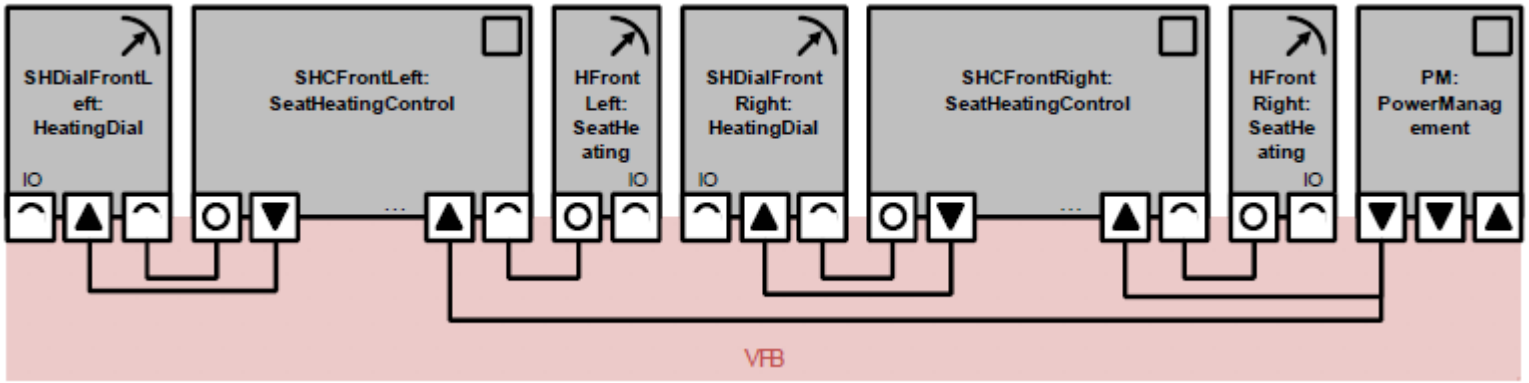
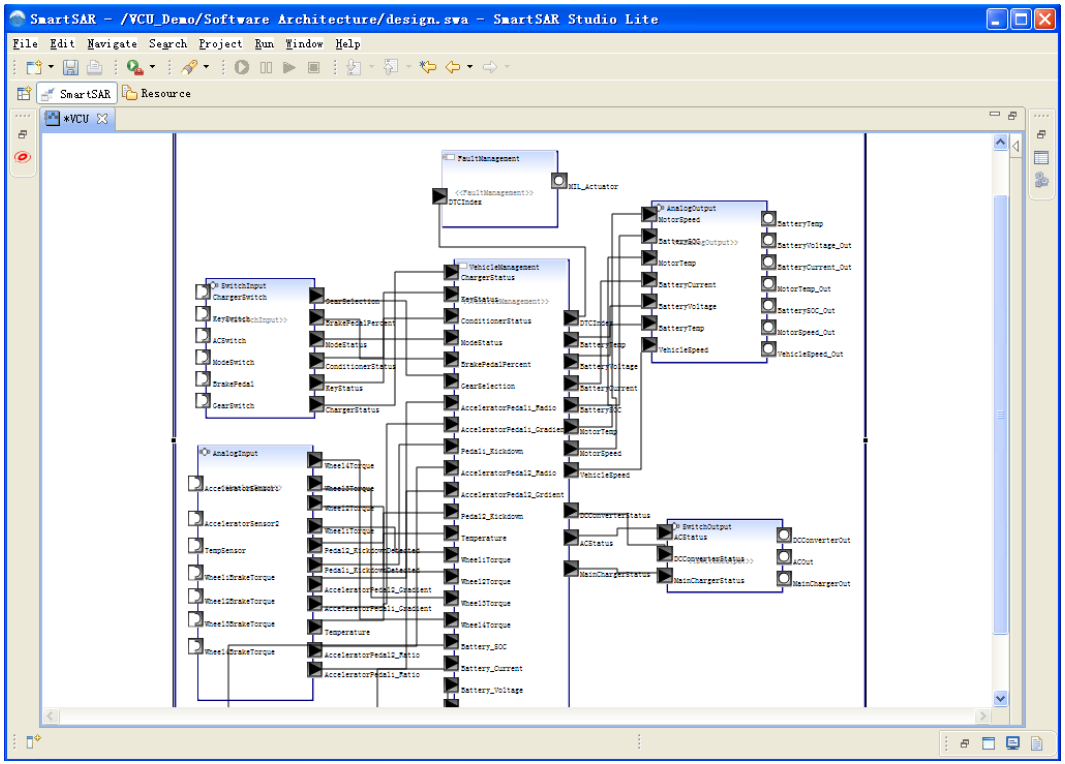
系统设计（系统配置输入）

- 软件架构设计：设计软件组件SW-C，包括data types、ports、interfaces等
- 收集ECU资源：处理器、内存、外设、执行器、传感器等规格
- 指定系统约束：总线速率、总线拓扑等约束



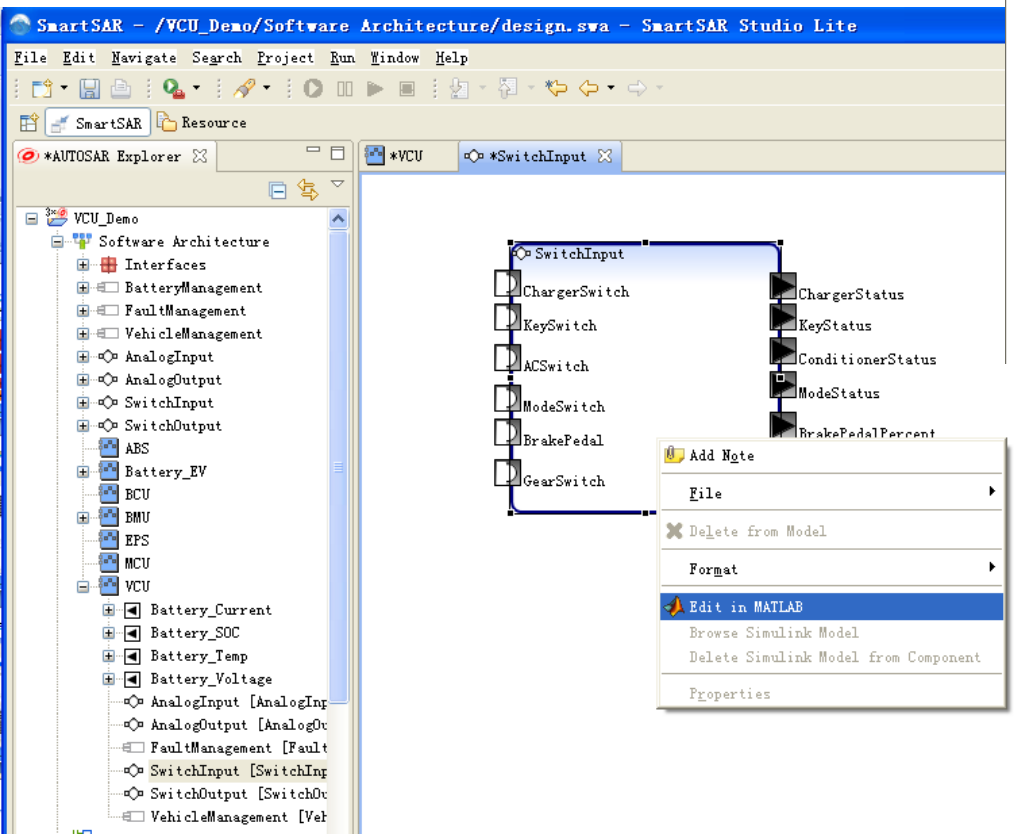
系统设计之软件架构

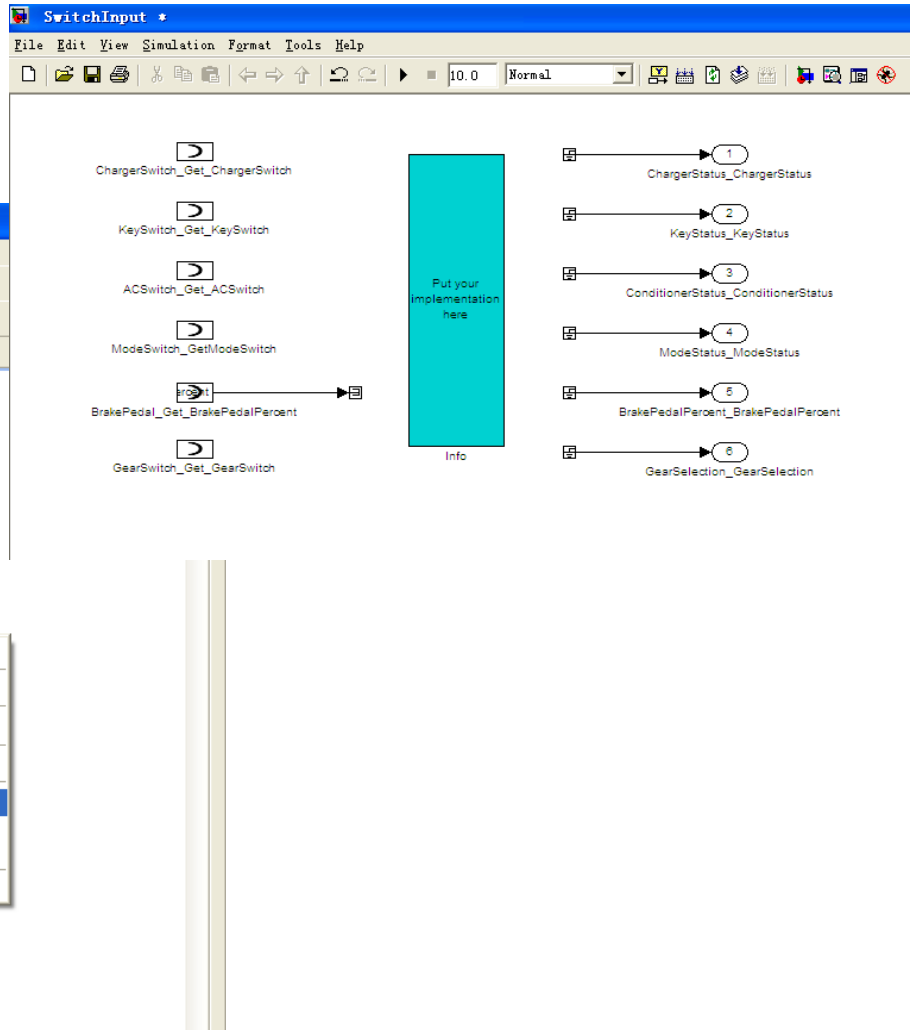
- SW-C的设计和新建
- SW-C的输入输出的定义（Port、Interface）
- SW-C之间的关系绑定（Connector）



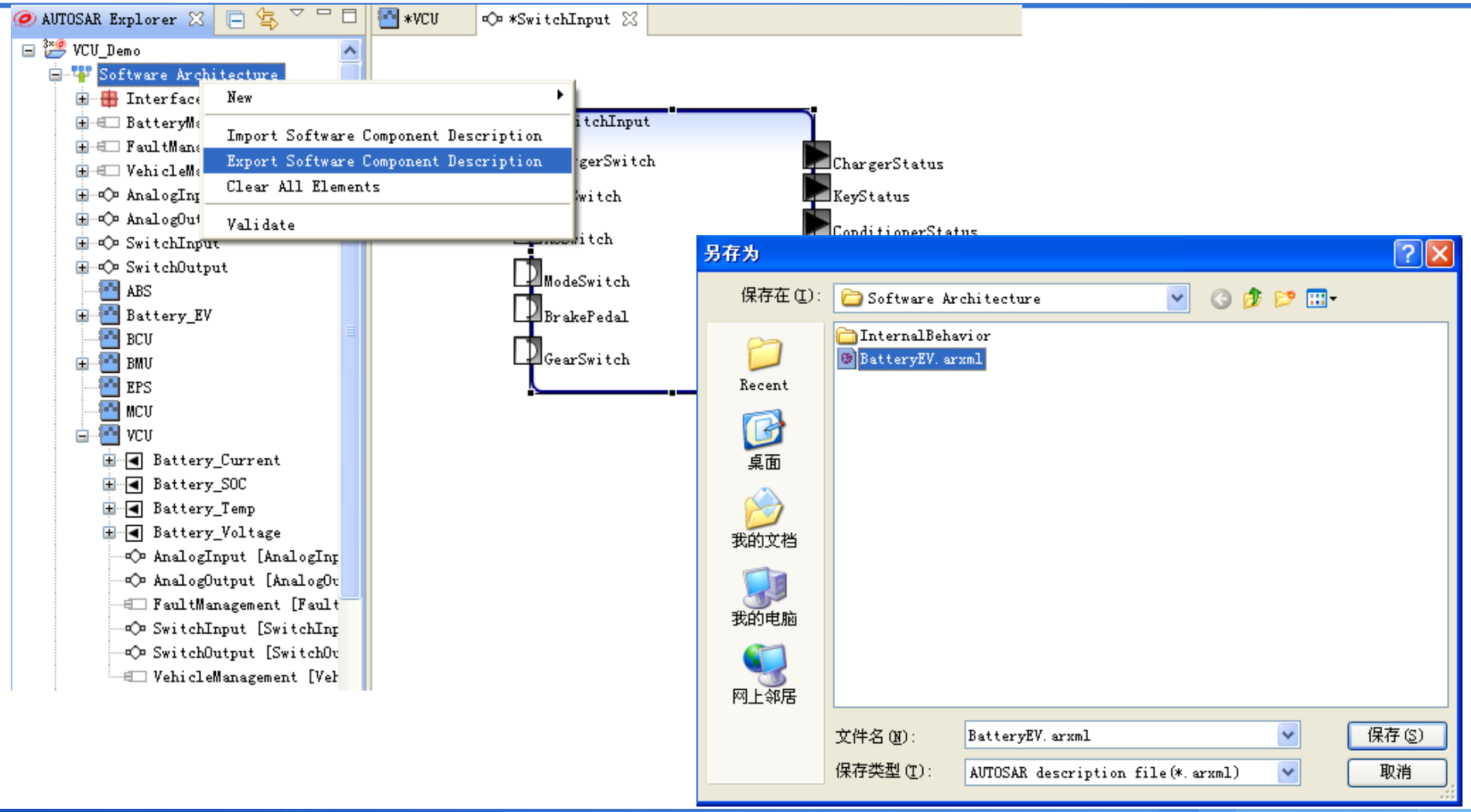
系统设计之SW-C实现

- 通过Simulink等工具建模





系统设计之SW-C描述导出（arxml）



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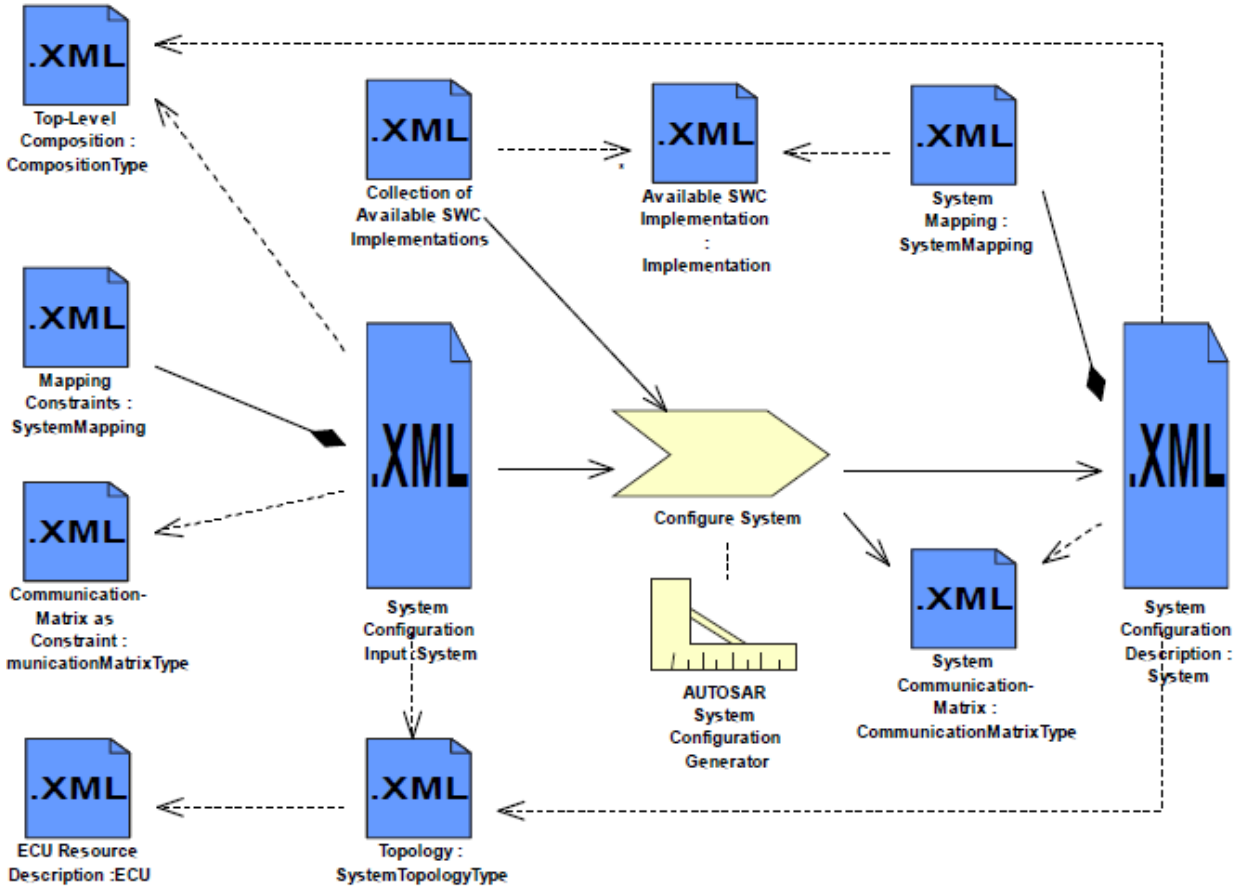
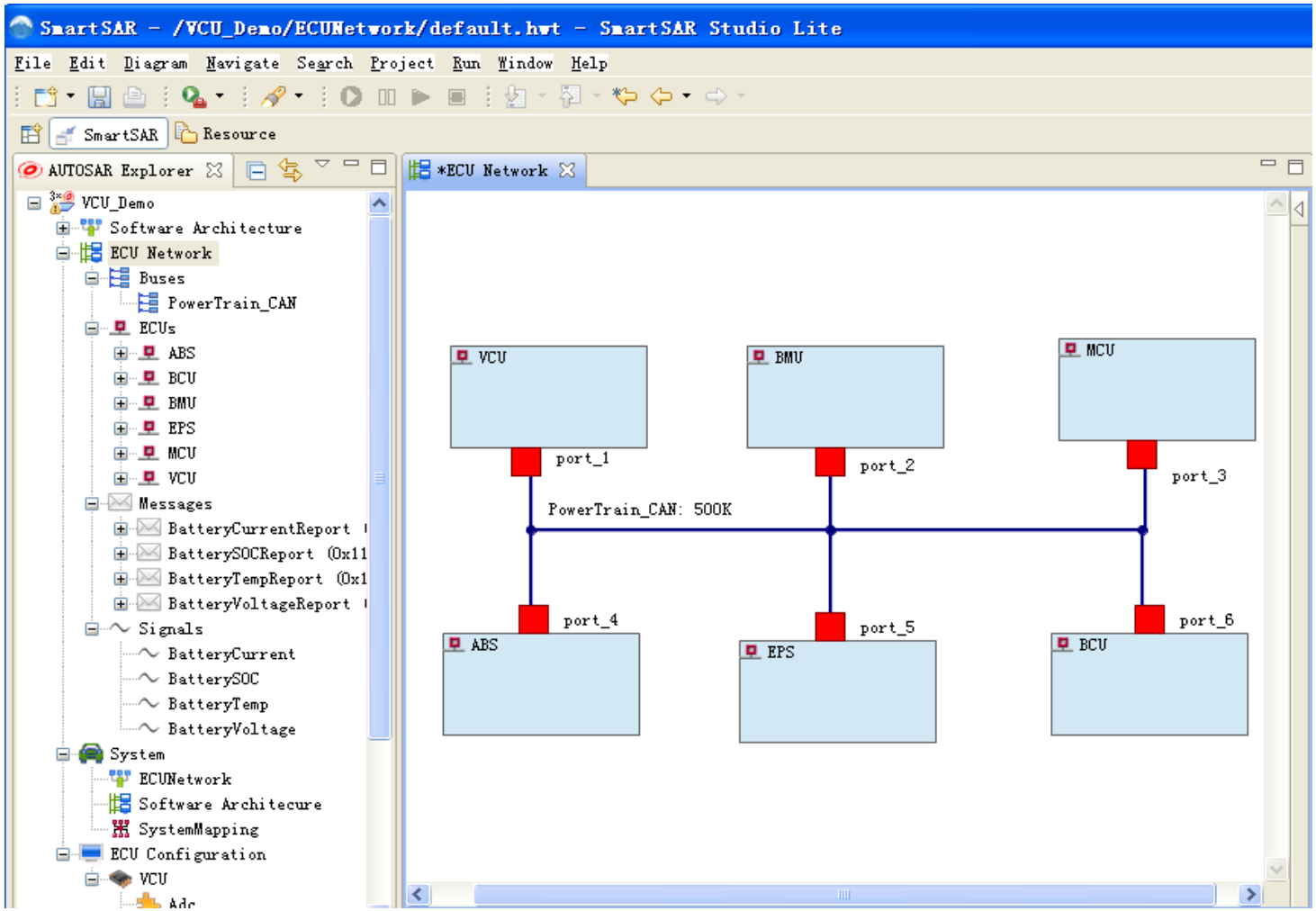
系统配置概述

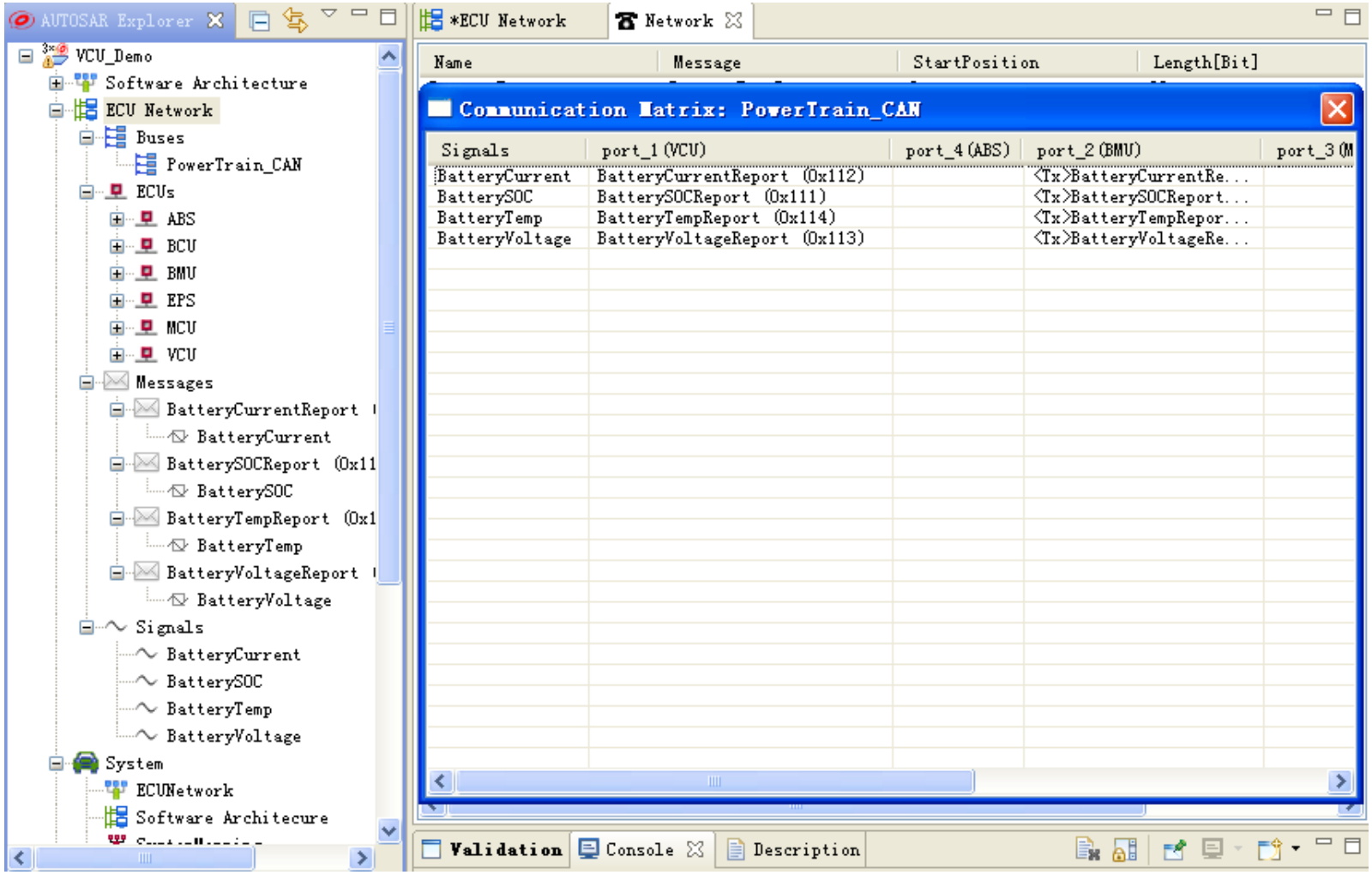
- 硬件约束输入
- 总线约束输入
- SW-C映射



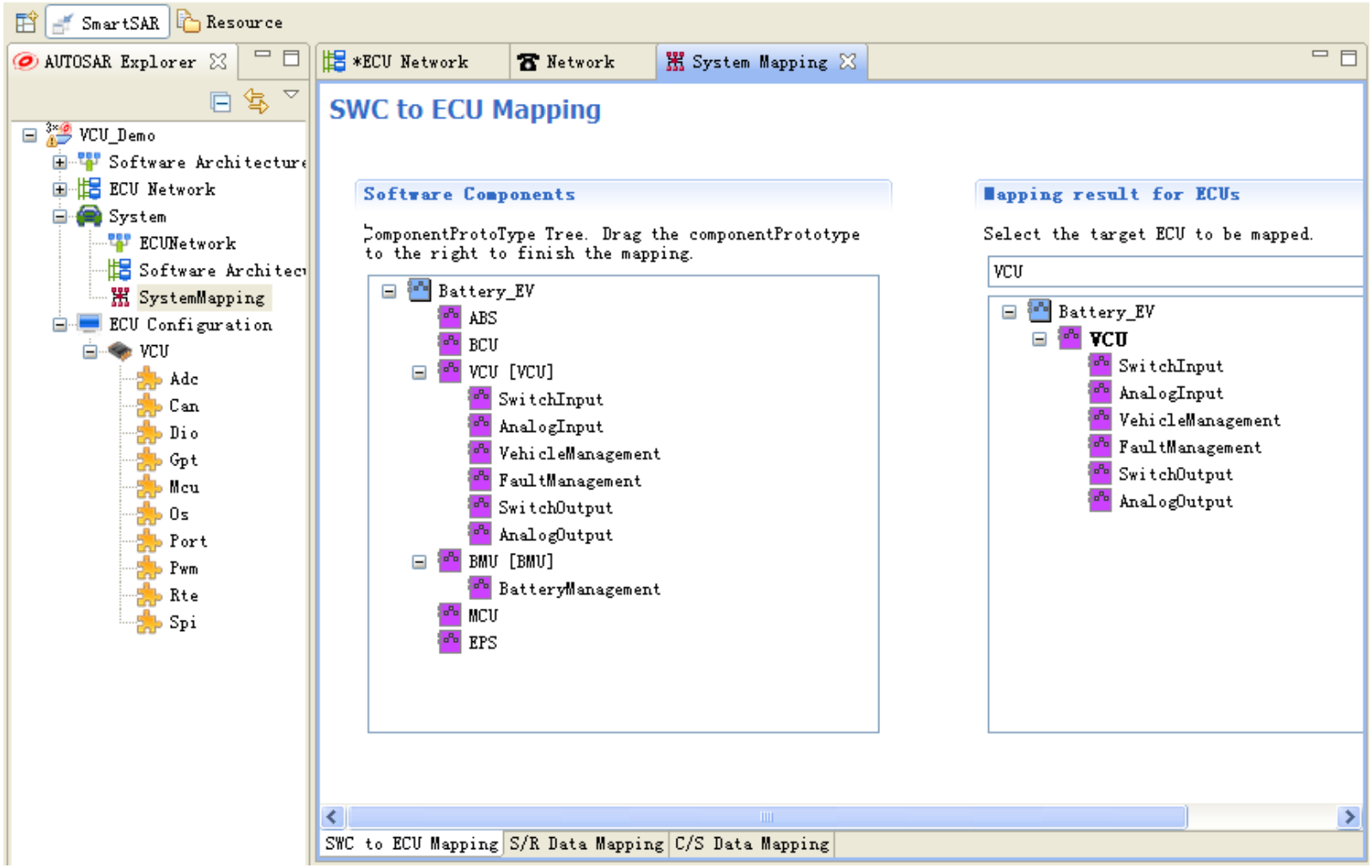
系统配置之总线的硬件拓扑



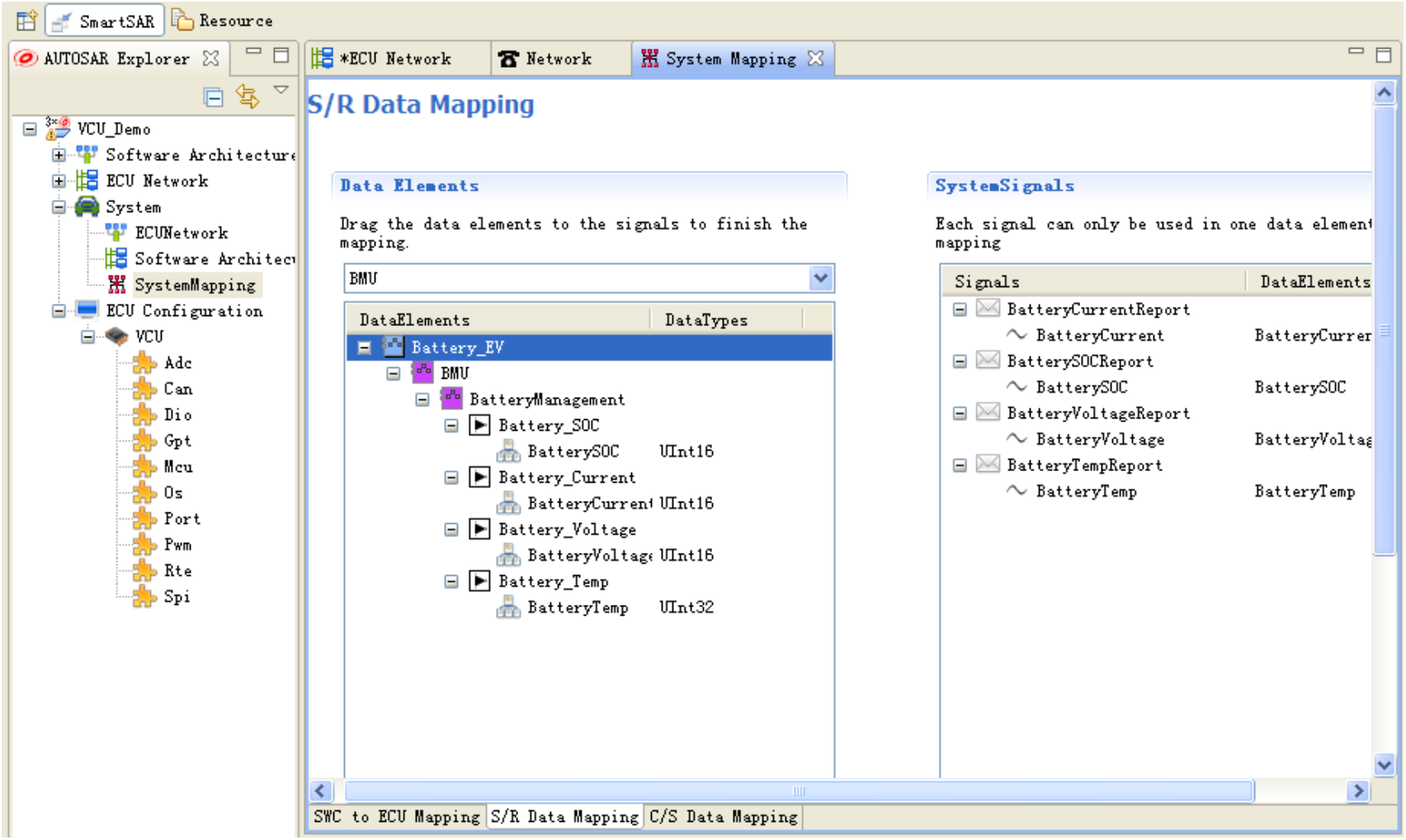
系统配置之通信矩阵设计



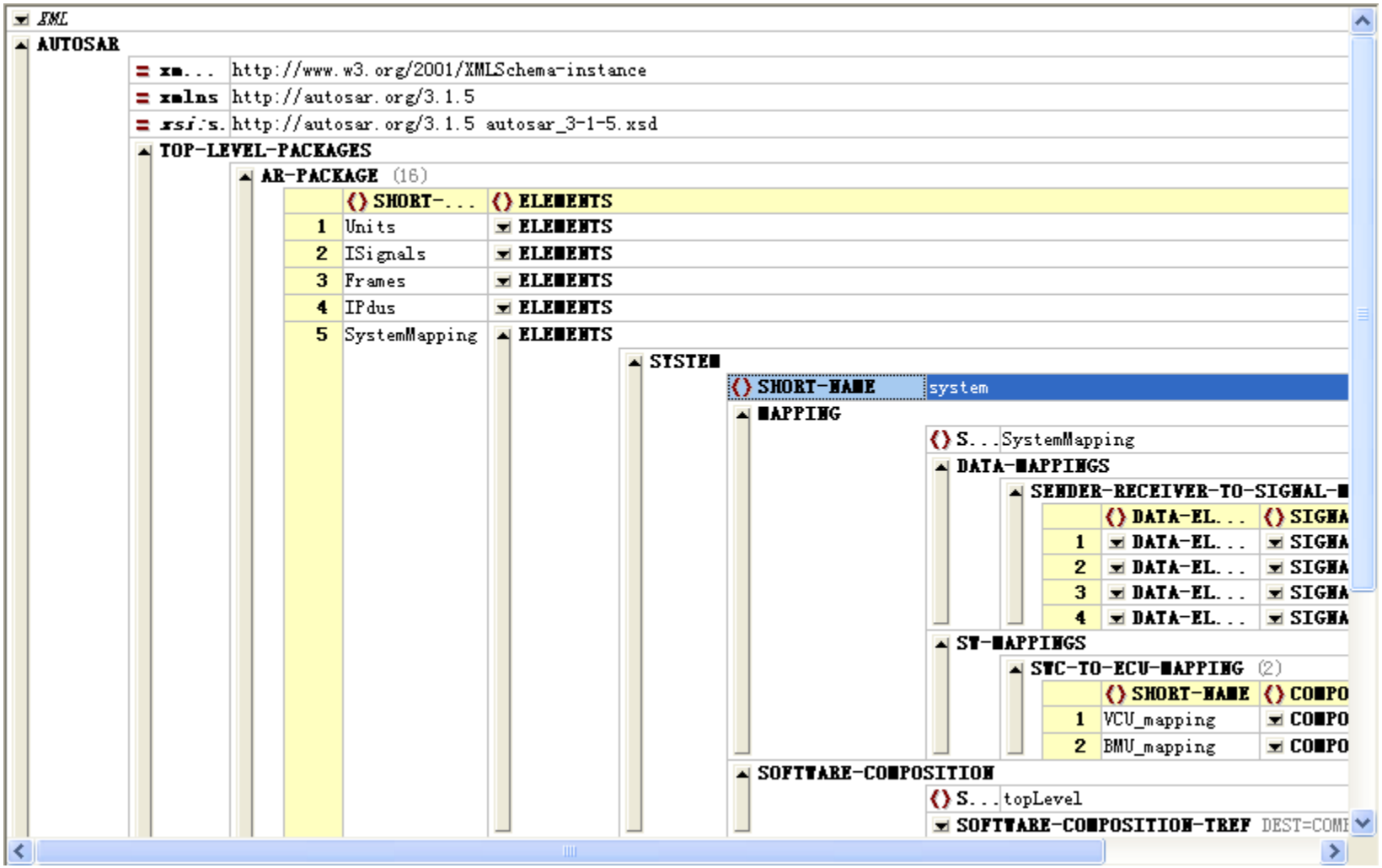
系统配置之SW-C与硬件映射



系统配置之数据映射


SmartSAR
Resource
AUTOSAR Explorer
VCU_Demo
Software Architecture
ECU Network
System
ECUNetwork
Software Architecture
SystemMapping
ECU Configuration
VCU
Adc
Can
Dio
Gpt
Mcu
Os
Port
Pwm
Rte
Spi
*ECU Network
Network
System Mapping
S/R Data Mapping
Data Elements
Drag the data elements to the signals to finish the mapping.
BMU
DataElements
DataTypes
Battery_EV
BMU
BatteryManagement
Battery_SOC
BatterySOC
UInt16
Battery_Current
BatteryCurrent
UInt16
Battery_Voltage
BatteryVoltage
UInt16
Battery_Temp
BatteryTemp
UInt32
SystemSignals
Each signal can only be used in one data element mapping
Signals
DataElements
BatteryCurrentReport
BatteryCurrent
BatteryCurrer
BatterySOCReport
BatterySOC
BatterySOC
BatteryVoltageReport
BatteryVoltage
BatteryVoltag
BatteryTempReport
BatteryTemp
BatteryTemp
SWC to ECU Mapping
S/R Data Mapping
C/S Data Mapping

系统配置描述的导出与抽取（arxml）



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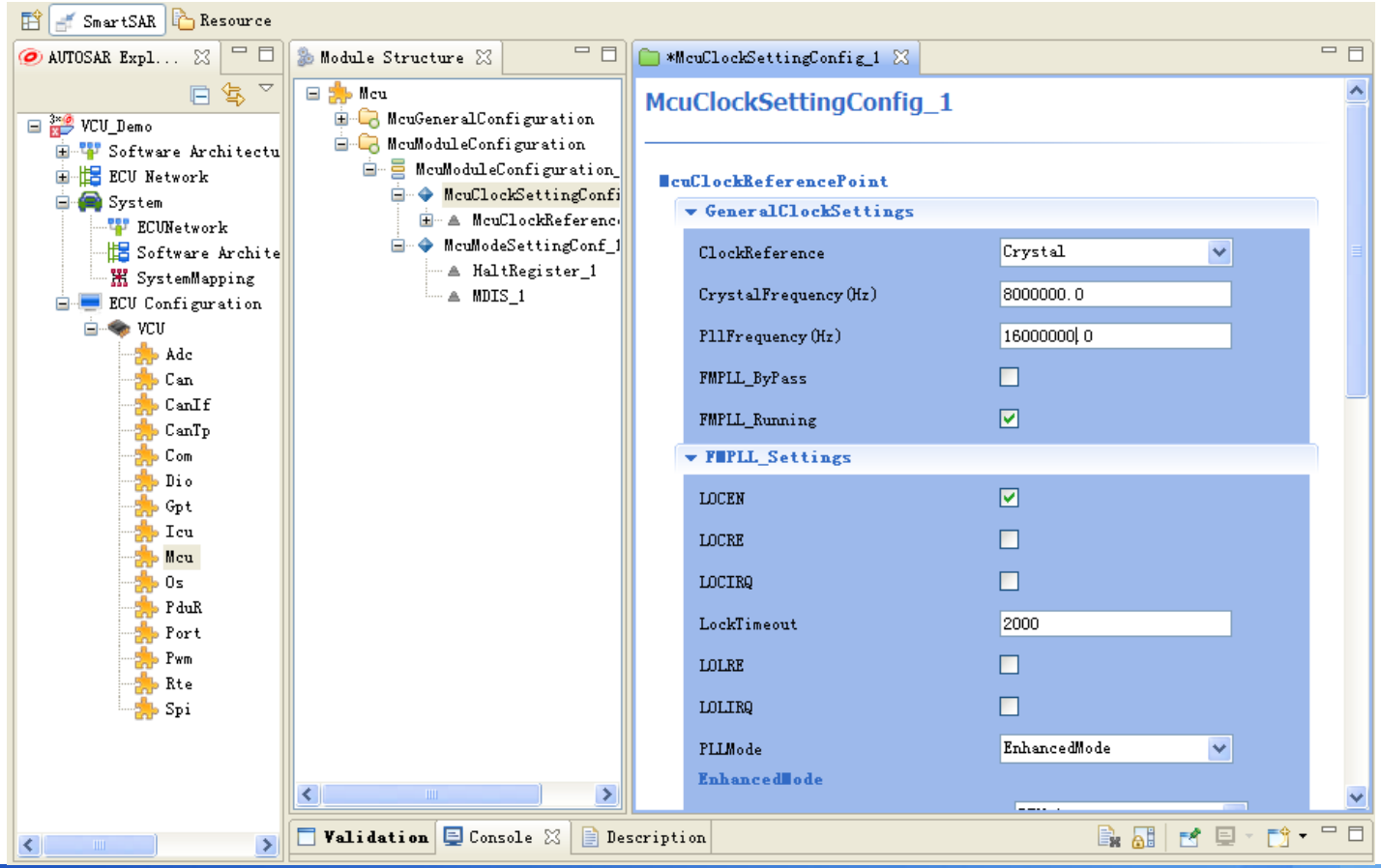
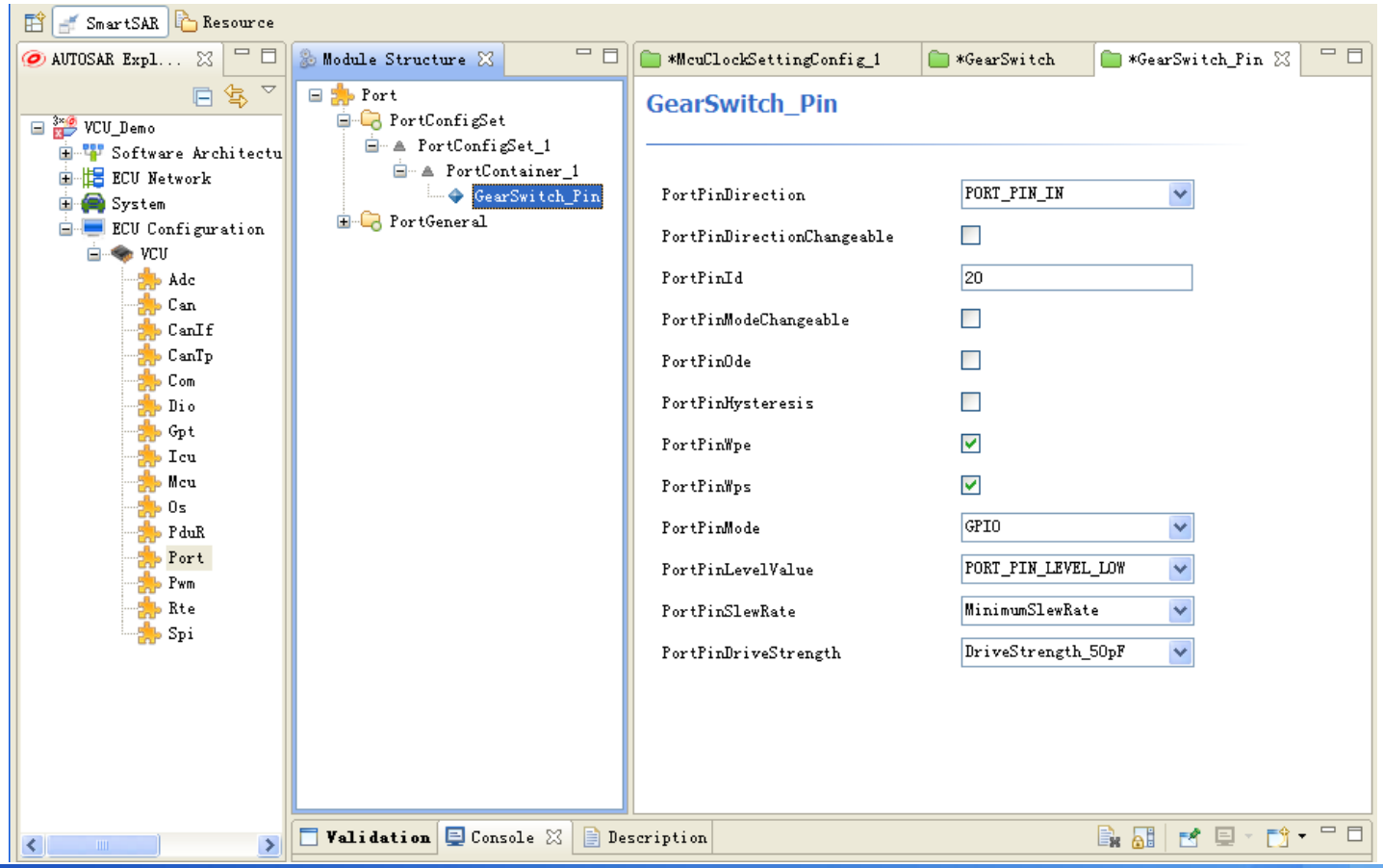
ECU配置

- MCU基本配置



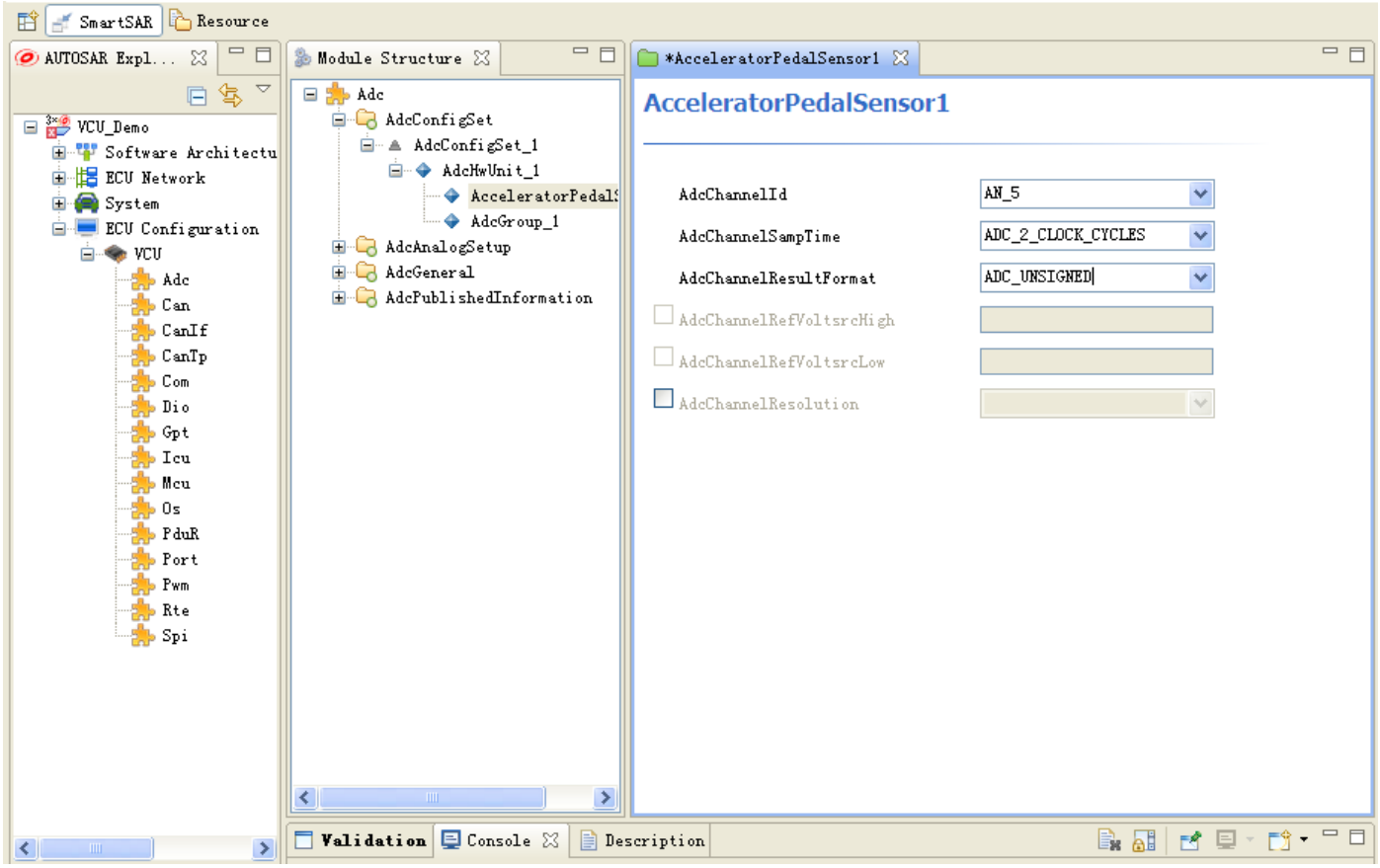
ECU配置

- 信号引脚的配置



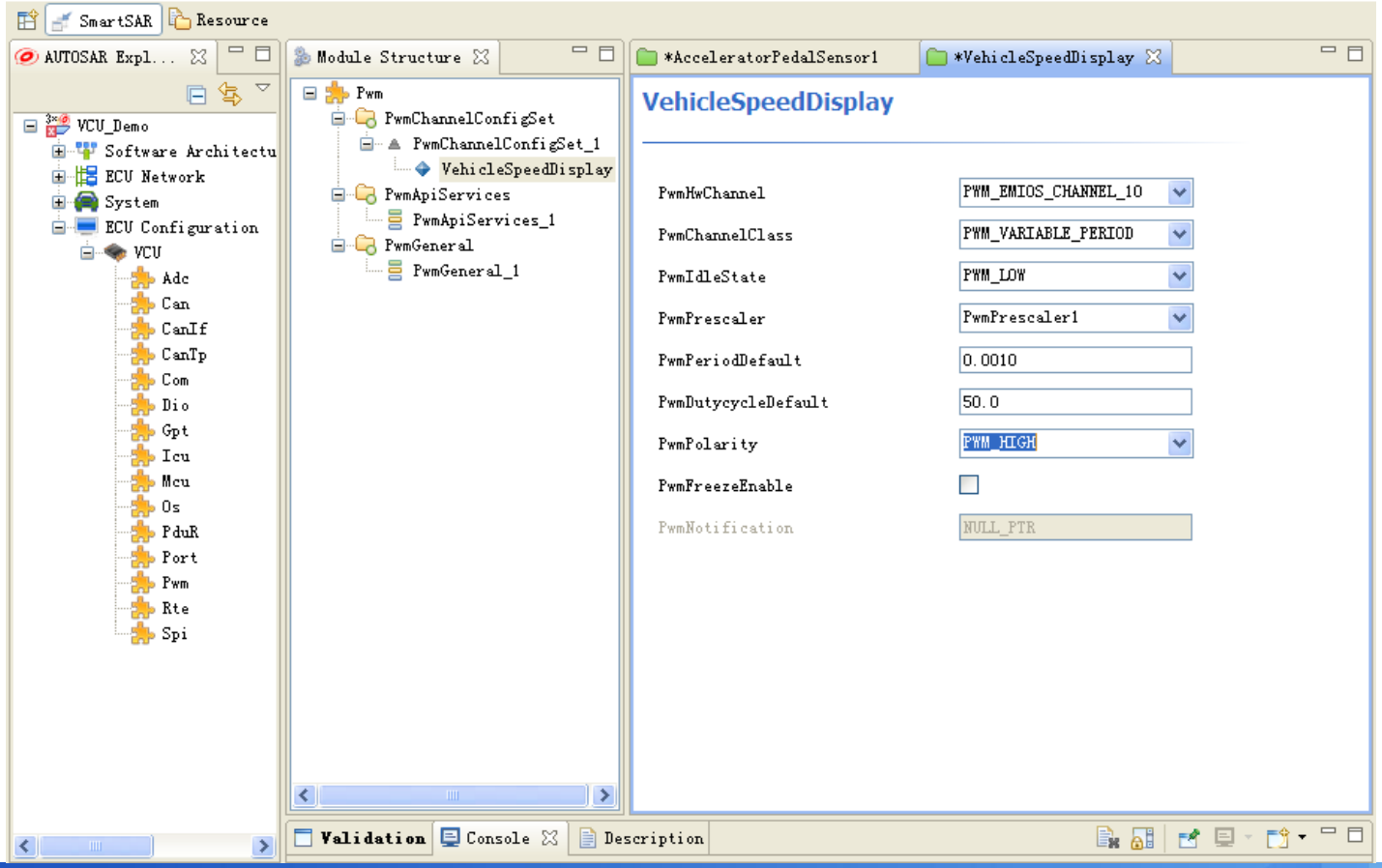
ECU配置

- 模拟输入信号的配置（ADC）



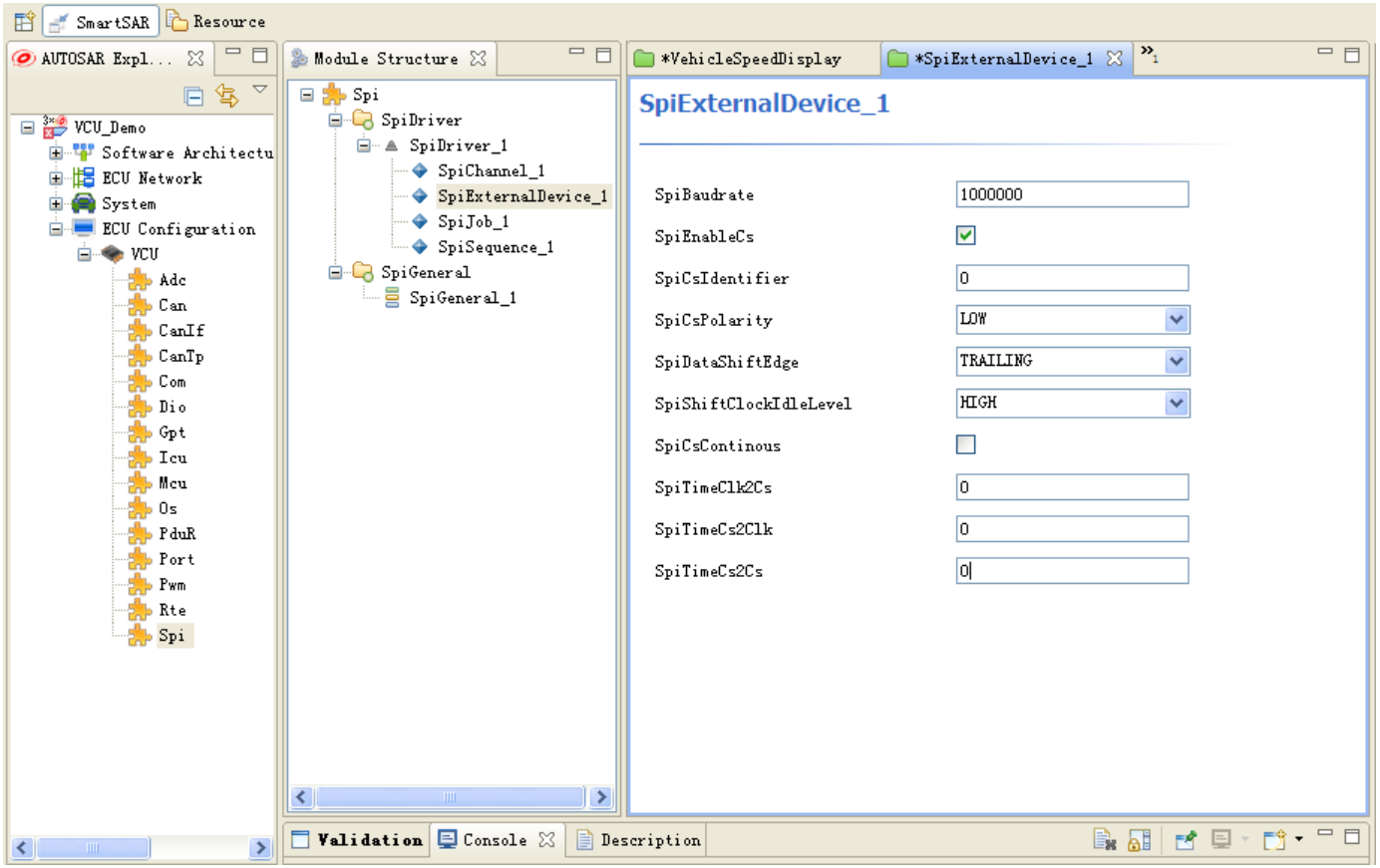
ECU配置

- 模拟输出信号的配置（PWM）



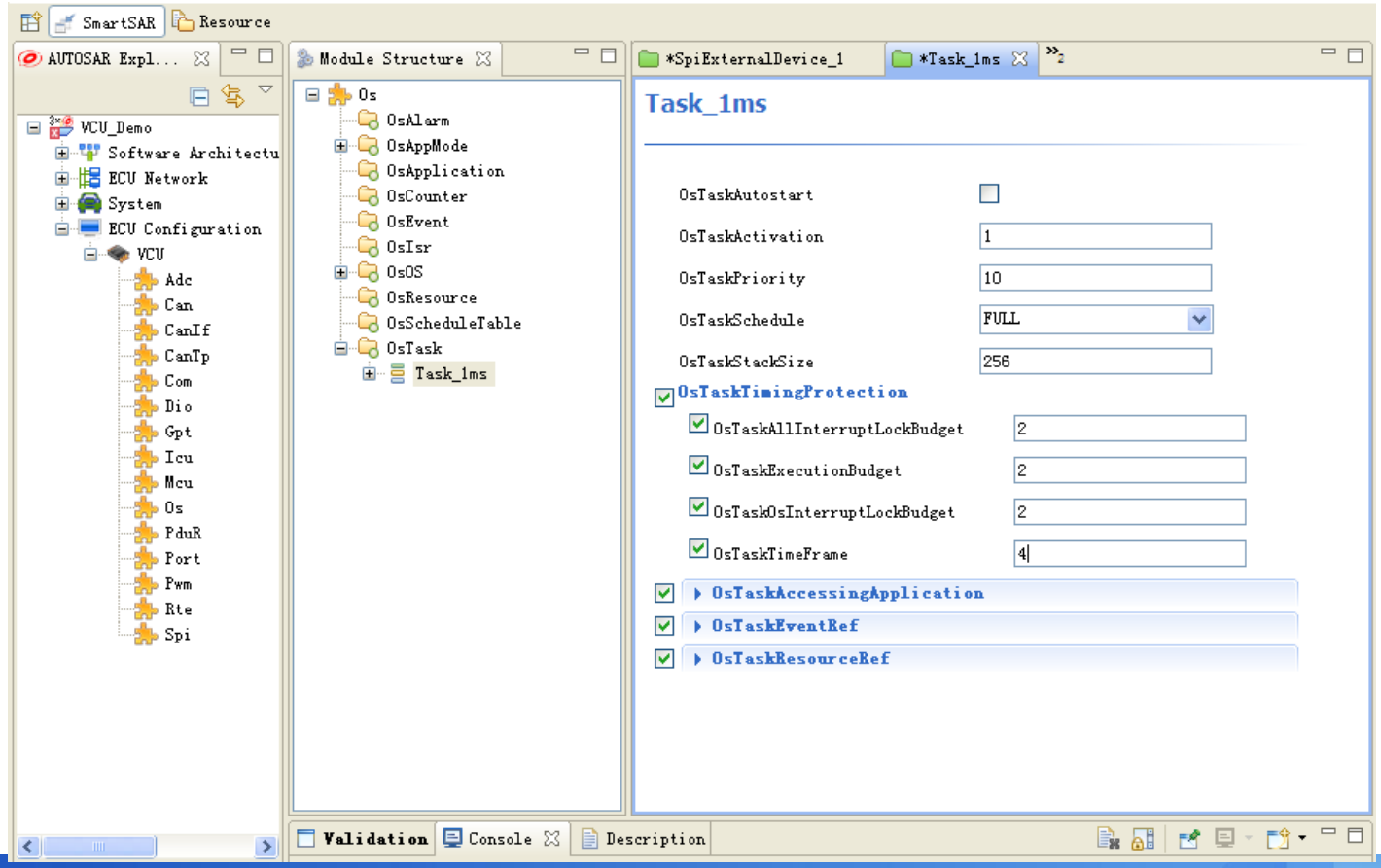
ECU配置

- 总线信号的配置（CAN，SPI）



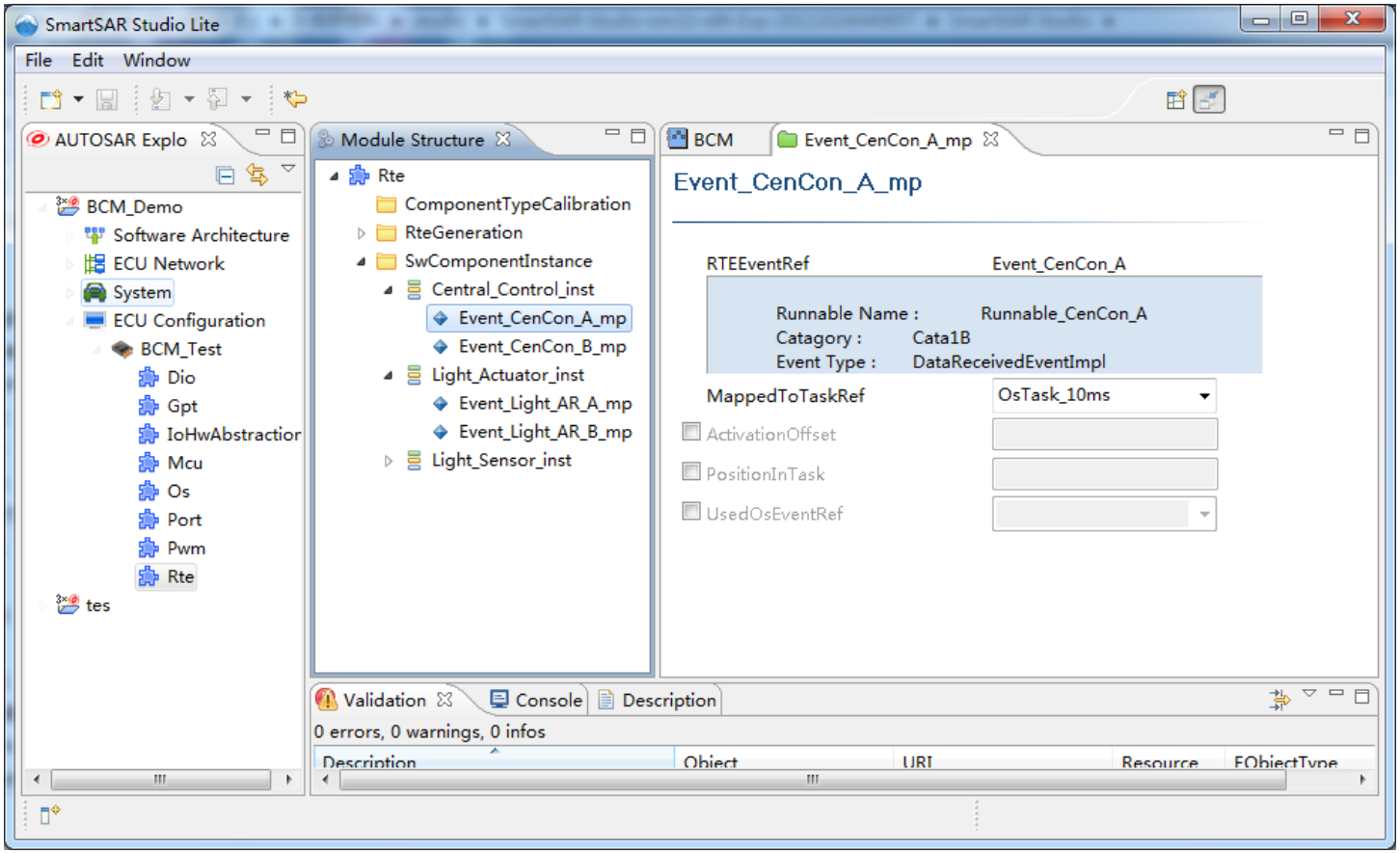
服务配置

- RTOS等模块的配置



服务配置

- RTE的配置


SmartSAR Studio Lite
File Edit Window
AUTOSAR Explo
BCM_Demo
Software Architecture
ECU Network
System
ECU Configuration
BCM_Test
Dio
Gpt
IoHwAbstractior
Mcu
Os
Port
Pwm
Rte
tes
Module Structure
Rte
ComponentTypeCalibration
RteGeneration
SwComponentInstance
Central_Control_inst
Event_CenCon_A_mp
Event_CenCon_B_mp
Light_Actuator_inst
Event_Light_AR_A_mp
Event_Light_AR_B_mp
Light_Sensor_inst
BCM
Event_CenCon_A_mp
Event_CenCon_A_mp
RTEEventRef
Event_CenCon_A
Runnable Name :
Runnable_CenCon_A
Catagory :
Cata1B
Event Type :
DataReceivedEventImpl
MappedToTaskRef
OsTask_10ms
ActivationOffset
PositionInTask
UsedOsEventRef
Validation
Console
Description
0 errors, 0 warnings, 0 infos
Description
Object
URI
Resource
EObjectType

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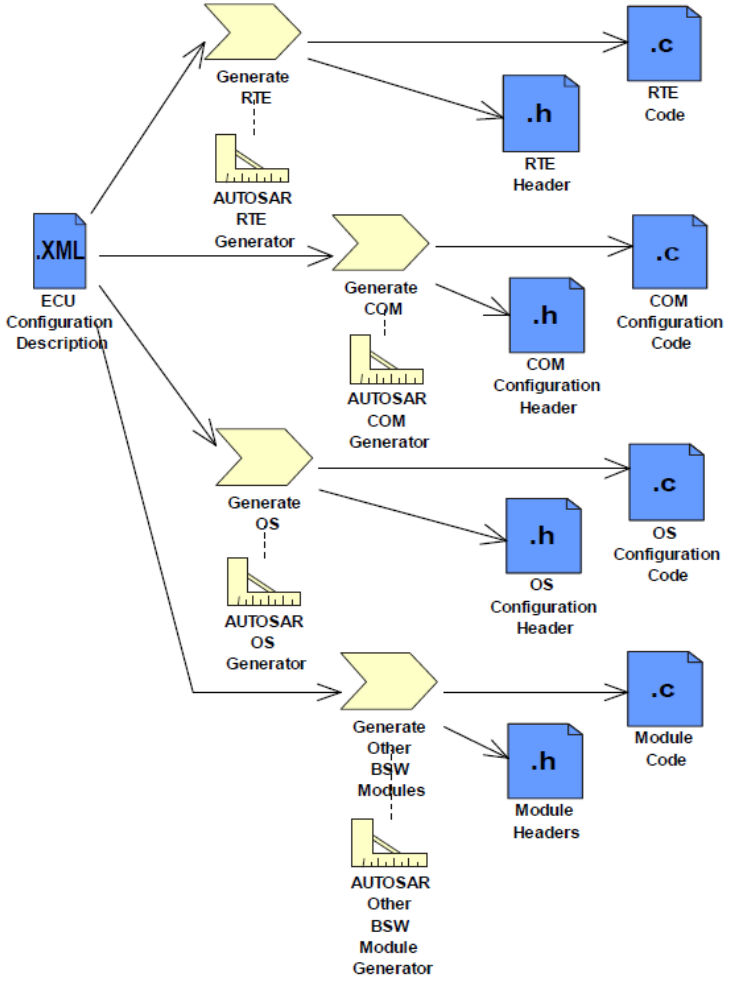
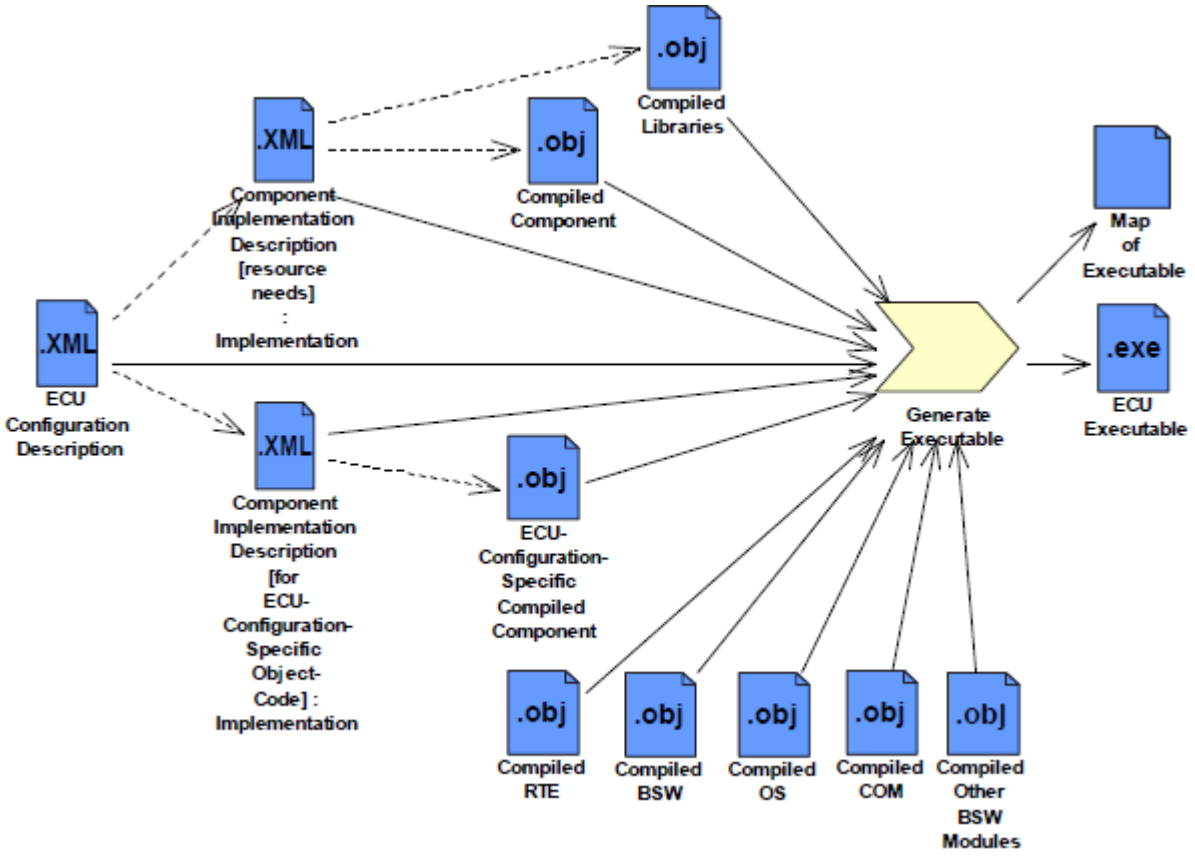
生成代码

- 生成RTE
- 生成COM的应用
- 生成OS的应用
- 生成BSW的应用



生成可执行文件

- 链接以下目标代码：
  - 编译后的SW-C
  - SW-C的相关库
  - 编译后的RTE
  - 编译后的BSW
  - 编译后的COM
  - 编译后的OS



参考文档

- 《AUTOSAR_Methodology.pdf》
- 《AUTOSAR_SWS_VFB.pdf》
- 《SmartSAR Studio User Manual.pdf》

Thanks

Q&A