

EDONA / HMI

MODELLING OF ADVANCED AUTOMOTIVE INTERFACES

S. BOISGÉRAULT, E. VECCHIÉ
MINES PARISTECH

O. MEUNIER
INTEMPORA

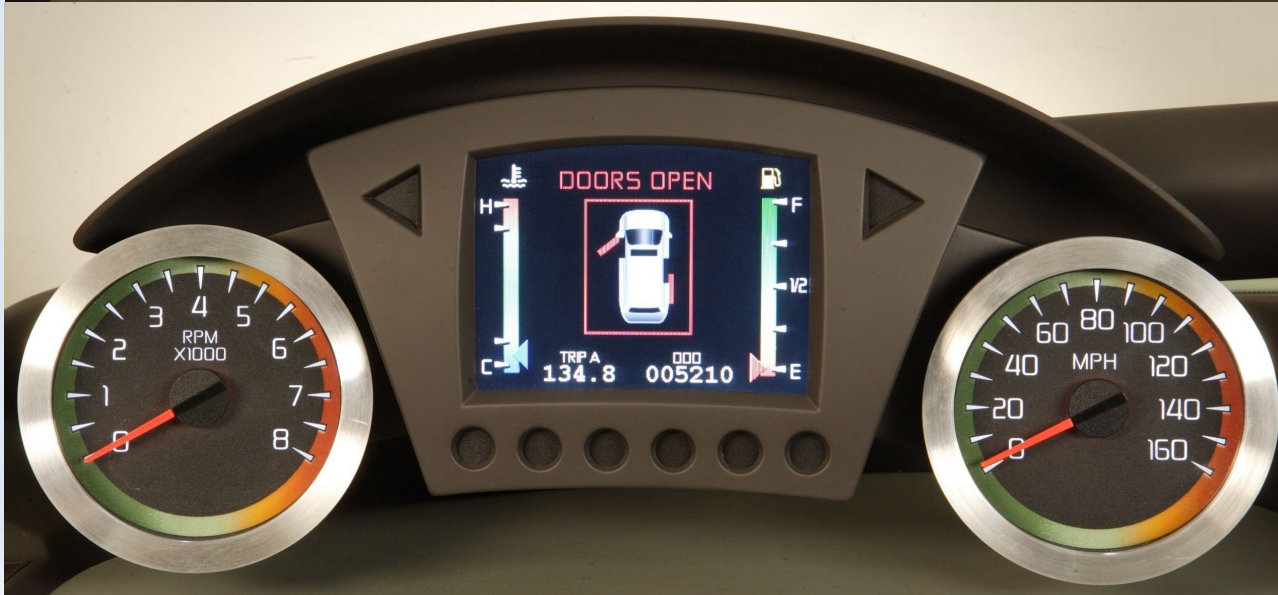
J.-M. TEMMOS
VISTEON SOFTWARE TECHNOLOGIES



VISTEON X-WAVE



DISPLAYS VS CLASSIC DEVICES



EDONA/HMI USE CASE LOVE INTERFACE



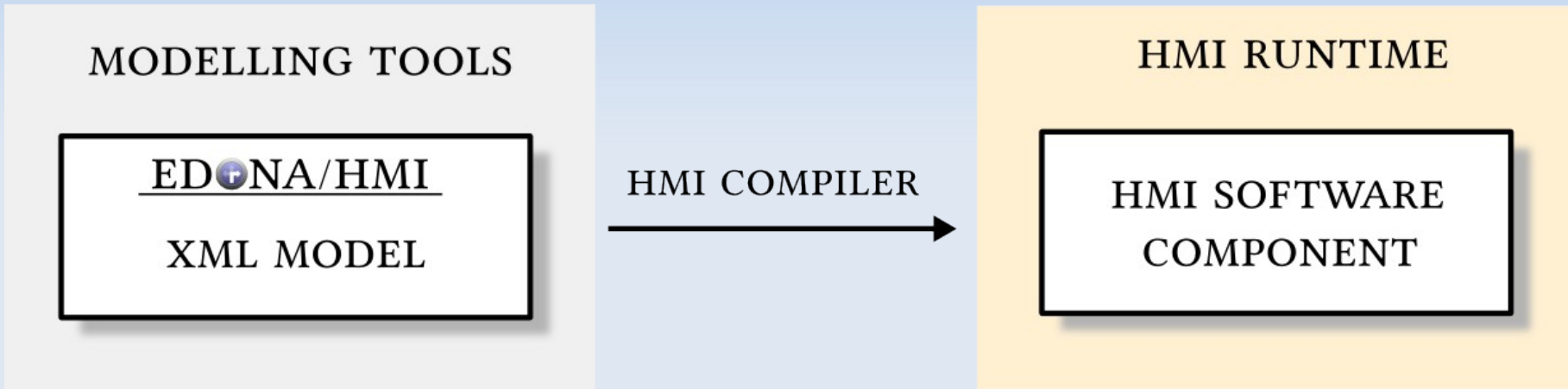
AUTOMOTIVE HMIs: ISSUES



EDONA/HMI

SIMPLE AND ADVANCED INTERFACES,
RAPID APPLICATION DEVELOPMENT,
INTEROPERABILITY AND STANDARDS,
SAFETY OF EMBEDDED SYSTEMS.

MODEL-DRIVEN DESIGN



HMI MODEL DESCRIPTION

ED+NA/HMI
MODEL

GRAPHICS

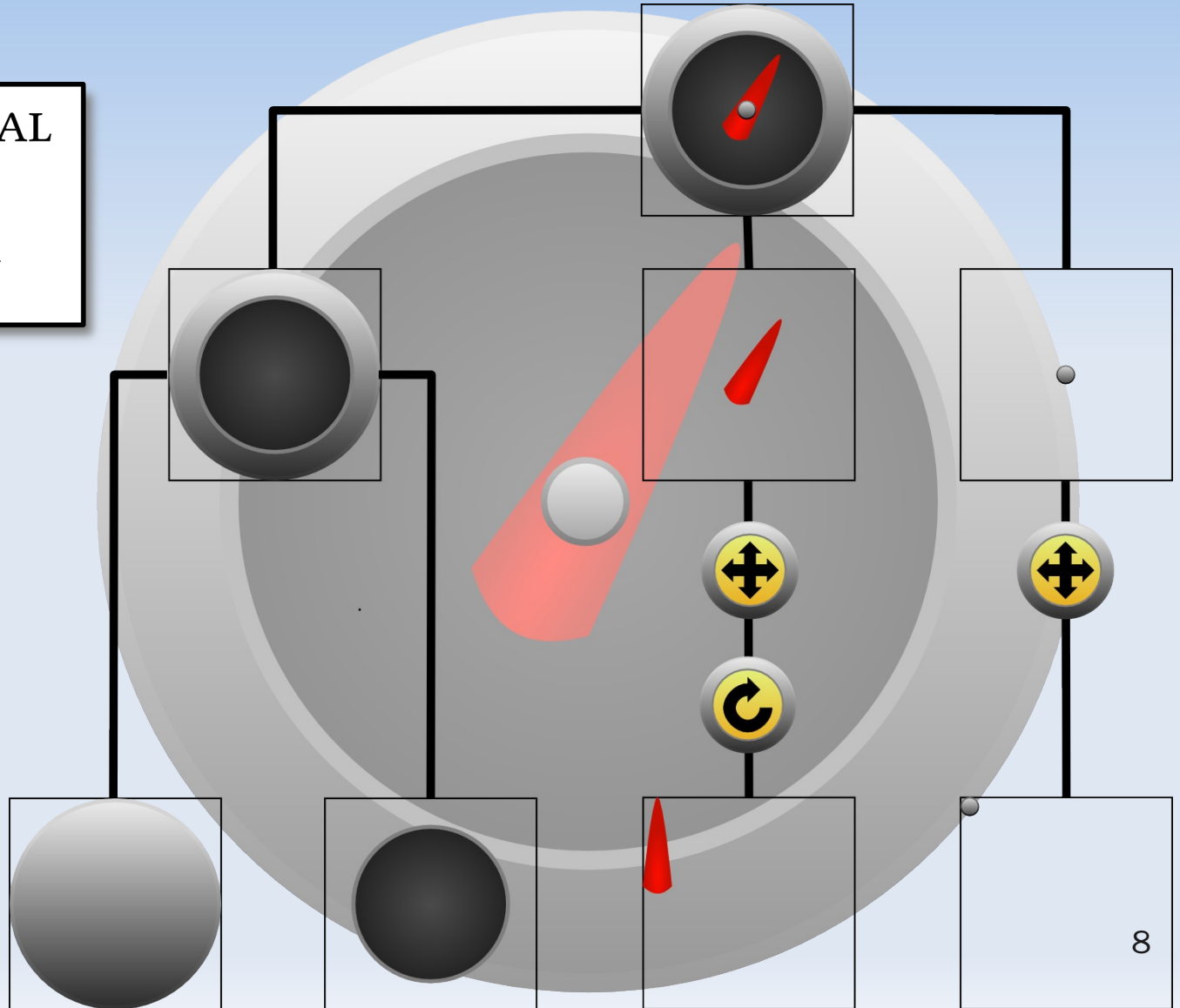
+

FUNCTIONAL



GRAPHICS MODEL

- 2-DIMENSIONAL
- SCENE GRAPH
- DATA-DRIVEN



STATIC SCENE GRAPH

EDONA/HMI

```
group(opacity ← 1.0, rotate ← 0.0)  
  ⟨ text(…), image(…), line(…) ⟩
```

```
text(data ← “EDONA/HMI”,  
  fill ← rgb(0, 0, 0),  
  stroke ← ⊥,  
  font ← “Libertine”,  
  font-size ← 72,  
  translate ← (30, 0))
```

```
line( $x_1$  ← 0,  $y_1$  ← 100,  
   $x_2$  ← 900,  $y_2$  ← 100,  
  fill ← ⊥,  
  stroke ← rgb(0, 0, 0),  
  stroke-width ← 5)
```

```
image(data ← “file: direction.png”,  
  width ← 75, height ← 75,  
  translate ← (250, 0))
```

DATA-DRIVEN SCENE GRAPH

1. INTRODUCE DATA FLOWS

```
group(opacity ← opacity, rotate ← angle)  
  < text(...), image(...), line(...)>
```

2. CONTROL THE GRAPHICS STATE

```
opacity ← 0.7
```


```
angle ← 15.0
```

EDONNA/HMI

SCENE GRAPH FORMAT: SCALABLE VECTOR GRAPHICS

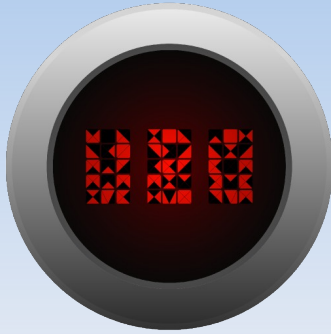


XML-BASED LANGUAGE FOR 2D GRAPHICS

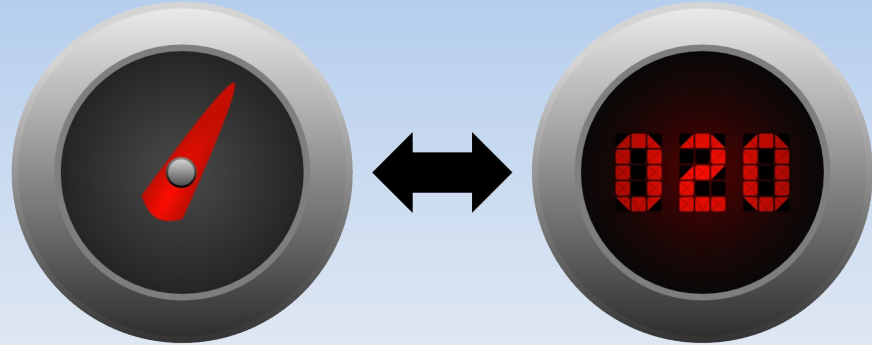
-  SVG OPEN STANDARD SINCE 2000,
- TARGET: THE WEB, LATER MOBILE PLATFORMS,
- GENERAL PURPOSE GRAPHICS LANGUAGE,
- RICH SYNTAX AND POWERFUL CONSTRUCTS,
- CONSISTENT EXTENSION/RESTRICTION POLICIES,
- AVAILABILITY OF SOFTWARE TOOLS.

LIMITATIONS OF PURE DATA-DRIVEN SCENE GRAPHS

CONSISTENCY



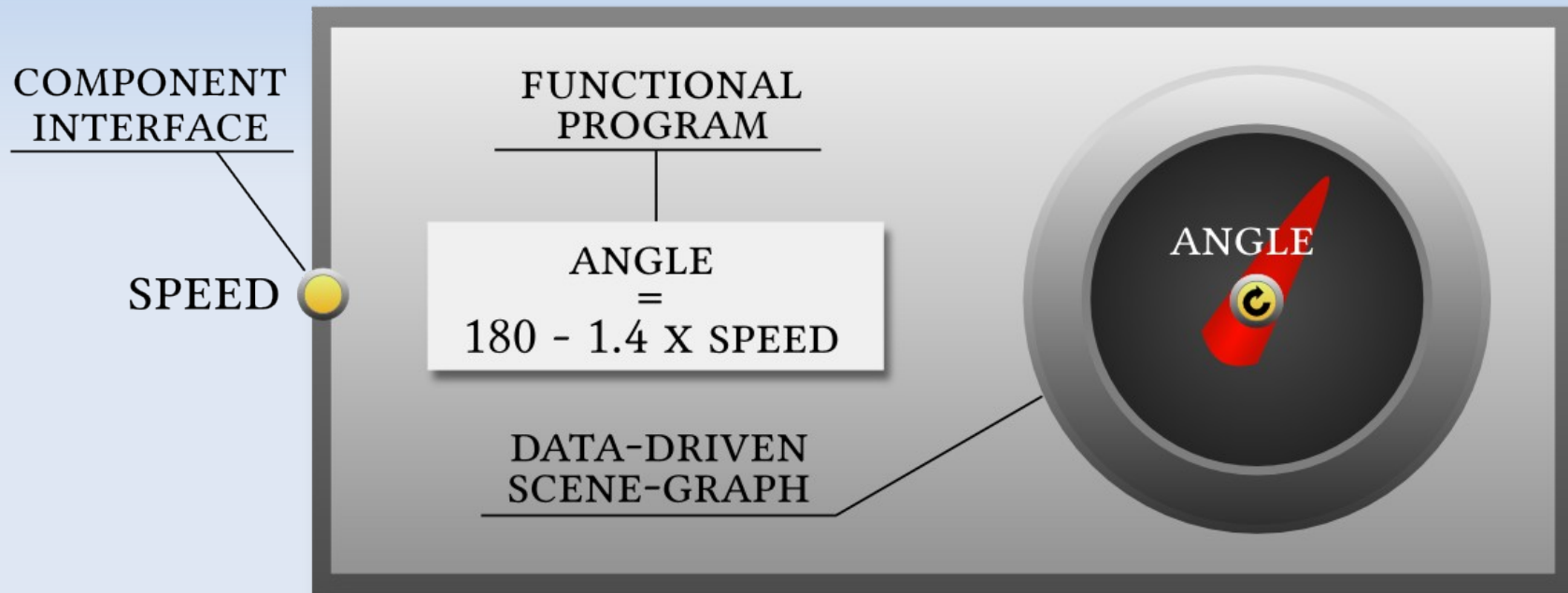
ABSTRACTION



SCALABILITY



COMPONENT MODEL



FUNCTIONAL MODEL

■ SYNCHRONOUS DATA-FLOW MODEL

```
stmt := flow = expr
      | next(flow1) = flow2
      | stmt1 || stmt2
      | stmt when flow
```

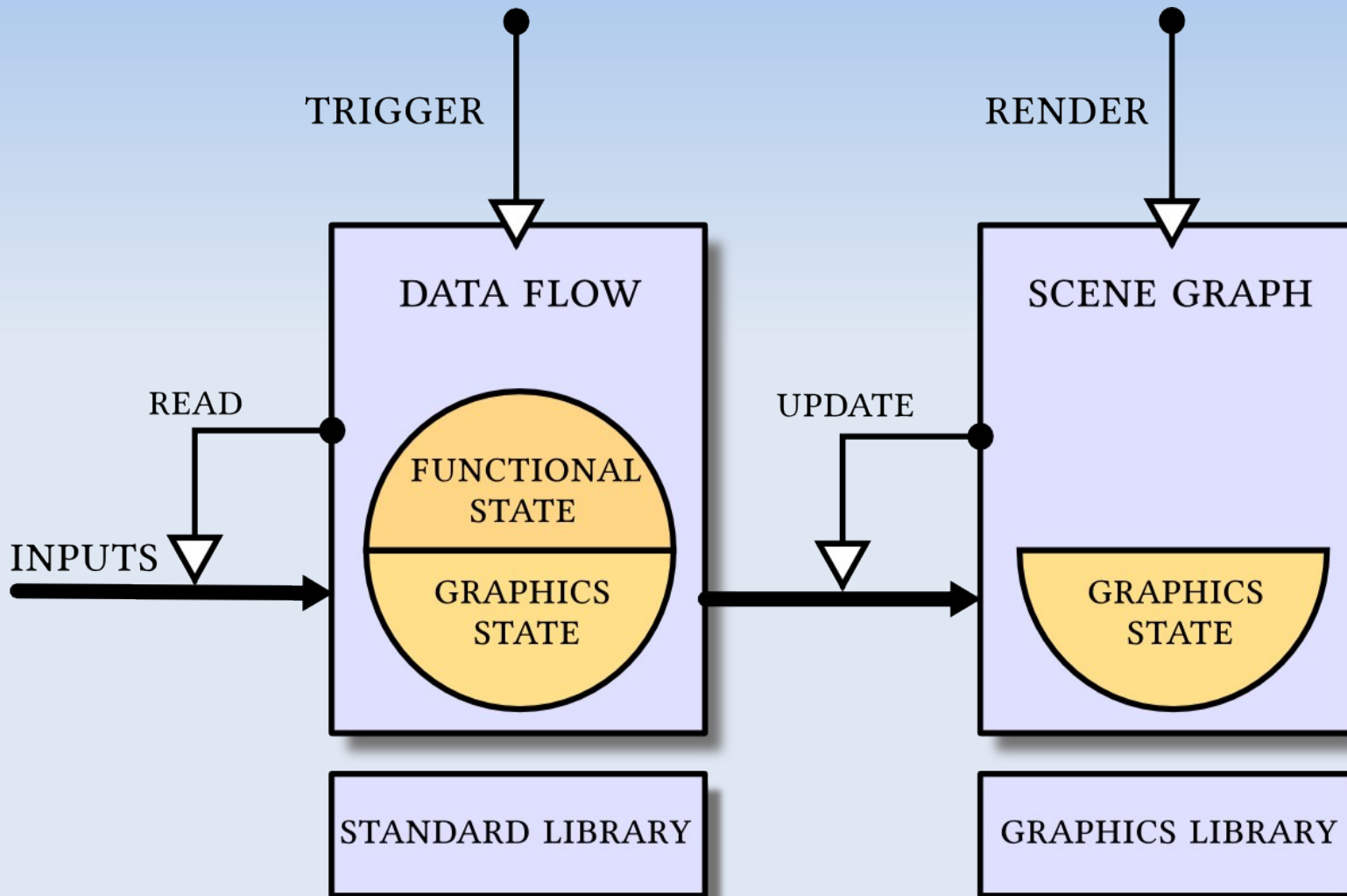
```
expr := constant
      | fct(flow1, flow1, ...)
      | flow1 ? flow2 : flow3
```

■ ELEMENTARY CONSTRUCTS & XML SYNTAX

■ DOMAIN-SPECIFIC FUNCTION LIBRARY

■ INTERFACES CONSISTENT WITH GRAPHICS HIERARCHY

RUNTIME ARCHITECTURE



SOFTWARE TOOLS

EDONA/HMI SOFTWARE



OPEN-SOURCE



PROPRIETARY

LOW-LEVEL MODELLING

XML API: ETREE COMPANION

EDONA/HMI API: XML PROXY

MODEL TOOLS

VALIDATION

DOC. GENERATION

INTERNATIONALIZATION

FORMAT CONVERTERS

HMI COMPILER + RUNTIME

PROTOTYPING AND SIMULATION
JAVA + BATIK TARGET

CERTIFIED CODE GENERATION
C + OPENGL-ES TARGET

QUESTIONS ?

