EAM: Ecosystemability Assessment Method

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Participating companies: Axis and VCC
Objectives

1. Develop an ecosystemability assessment method (called here EAM).

2. Compile a catalogue of ecosystem enabling architectural styles and best practices.

3. Enable companies reach and proactively run a sustainable ecosystem.
Sprint Goal

- Apply Framework
- Refine Framework
- Stabilize Framework

We explored specifics of participating companies.

The *three-view model for ecosystem architecture* allows us to relate results.
Software Ecosystemability

Ecosystem...

- Set of businesses
- Shared market
- Software and Services
- Relationships
- Common technological platform

...and ecosystemability

Degree to which a software system and its development environment support the vision of ecosystem.

The three-view model for ecosystem architecture

Organizational, software, and business interfaces

According to perspectives on ecosystems defined by Christensen et al.
Three view model for ecosystem architecture

- **Software Structure**
  - contains actor and software elements that are related to the construction of applications in the ecosystem

- **Organizational Structure**
  - contains actor and software elements that are related to the governance of the interaction and organization of the elements in the ecosystem

- **Business Structure**
  - contains actor and software elements that are related to how actors create, deliver, and capture value

[Christensen et al.: ]
Main Idea: Assess Interfaces of Ecosystem Elements

Method for UI Design

Cognitive Dimensions Framework

Developers are Users! → Reuse Persona Concept

Method for API Design

1. Not only platform APIs
2. API users can be API providers

Method for Business Interface Design in SECOs

<Business Viewpoint>

Consider business viewpoint

Method for Toolchain and Workflow Design in SECOs

<Organizational Viewpoint>

Consider organizational viewpoint

Method for API Design in SECOs

<Software Viewpoint>

Axis

VCC
Ecosystem Value Chain

Business Assets
- Services
- Data
- Products

Ecosystem Elements
- Provides access to Business Assets

Applications created using Ecosystem Elements

End-users

Developer
Ecosystem Value Chain

Business Assets
- Services
- Products
- Data

APIs provide access to Business Assets

Ecosystem Elements

Developer

Applications

Camera applications created using the APIs

End-users

...puts the APIs to work to create applications
Ecosystem Value Chain

Business Assets
- Services
- Data
- Products

Ecosystem Elements

Tool-based workflows provide access to Business Assets

Applications
- Application SW created using Ecosystem Elements

End-users

Developer

...applies workflows to create Application SW in ECUs
Preliminary Landscape of VCC Toolchain

- Tool Provider (Elektrobit, Mentor Graphics, ECU)
- Elektra tool
- Autosar model 100%
- VSA
- Supplier

- Validates:
  - Autosar model
  - VSA

- Teams:
  - Sys Dev
  - SWDev (ECU)
  - Elektra support
  - Comm Design
  - Autosar team

- Autosar Tier 2
  - Mentor Graphics
  - Elektrobit
  - Vector
  - Kpit
  - ...
Ecosystem/Platform Modeling

Ecosystem personas

Persona goals

Tasks to be implemented

API components

Source code

Any ecosystem element with interface
Ecosystem/Platform Modeling Example

Opportunistic app. developer

has goal

needs to implement

Get image from camera
Get image metadata
Compare images
Record video

accomplished with

has goal

Recording a short video to the SD card whenever a movement is detected

```
static media_stream * open_capture(void)
{
    media_stream *stream;
    char properties[SIZEOF_PROPERTIES];
    snprintf(properties, SIZEOF_PROPERTIES, CAPTURE_PROPERTIES);
    stream = capture_open_stream(IMAGE_UNCOMPRESSED,properties);
    return stream;
}
```

```
static media_frame * new_capture_frame(media_stream *stream)
{
    media_frame *frame = NULL;
    frame = capture_get_frame(stream);
    return frame;
}
```
VCC Ecosystem Modeling Example

Opportunistic app. developer

has goal

Develop application software for an ECU

Develop Application SW

Test Application SW

Commit Application SW

Elektra tool

VSA

Autosar model

Autosar Tier 2

Cognitive Dimension 1: Abstraction Level

What are the \textbf{minimum} and \textbf{maximum} levels of \textit{abstraction} exposed by the API?

- **Individual tasks** require two or more components  
  Components are considered \textbf{primitives}

- **Individual goal** requires the use of only one component  
  Components are described as \textbf{factored}

- **All set of goals could all be accomplished with the same set of components**  
  Components are described as \textbf{aggregate}
Assessing Suitability of SECO Element

<table>
<thead>
<tr>
<th>Ecosystem Element</th>
<th>ACAP (Platform)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perspective (=Persona)</strong></td>
<td>Client application developer, opportunistic</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>2 (scale: 1-5, 1= low, 5= high)</td>
</tr>
<tr>
<td><strong>Goal</strong></td>
<td>Recording a short video to the SD Card whenever a movement is detected</td>
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<tr>
<th>Dimension</th>
<th>Abstraction level</th>
<th>Learning style</th>
<th>Working framework</th>
<th>Progressive evaluation</th>
<th>Premature commitment</th>
<th>API elaboration</th>
<th>API viscosity</th>
<th>Consistency</th>
<th>Role expressiveness</th>
<th>Domain correspondence</th>
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<tr>
<td><strong>Which style of interaction does the Element imply?</strong></td>
<td>-1</td>
<td>1</td>
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<td></td>
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<tr>
<td><strong>Which style of interaction does the Persona prefer?</strong></td>
<td>-1</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Match of implication and preference</strong></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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Cognitive Dimension 2: Learning Style

What are the **learning requirements** posed by the Ecosystem?

**Goal**

**Minimal** learning style:
- No learning ambition

**Incremental** learning style:
- Exploratory programming

**Top-down** or **structured** learning style:
- Overview of the Ecosystem needed
- Architecture of the Ecosystem
## Assessing Suitability of SECO Element

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<th>Ecosystem Element</th>
<th>Autosar toolchain</th>
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<tr>
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<td>nn</td>
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**Goal**

Develop application software, test it, commit it

**Priority**

nn

### Dimension

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**Match of implication and preference**

- **1**
- **#**
- **##**
- **###**
- **####**
- **####**
- **####**
- **####**
- **####**
- **####**
- **####**
- **####**
Plans for Sprint 8

• Connect with strategic decision making on assessment template

• Continue interviews / workshops in teams
  — Assess the ecosystems
  — Discuss implications on technical platform

• Refine Ecosystemability Framework
  — Focus: APIs and Organizational Interfaces

• Outreach
  — Assessment of Framework
  — Knowledge Exchange
  — Universities
    • Tampere, FIN (Tommi Mikkonen et al.)
    • UVic, CAN (Daniela Damian et al.)
    • Copenhagen, DK
    • Hannover, GER
  — More Companies
    • Jetshop, GM, …