Advanced Driver
Information Technology

IVI Graphic Subsystem:

Weston IVI-shell is ready for Product

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Contents

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Trend of Graphic stacks in automotive segment

- **Proprietary to Common**
- **Complexity to Light weight**

- **Wayland/Weston is one of candidates**
  - Distill out functions from X server

- **Trends**
  - Tizen IVI: 2014 M1
  - GENIVI: 2014 GENIVI AMM
  - many companies shift proprietary stacks to using Wayland/Weston

Problem & Solution : Wayland/Weston to IVI

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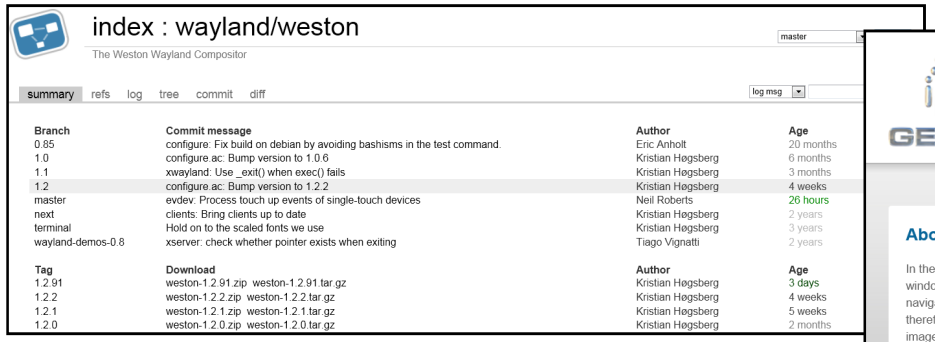
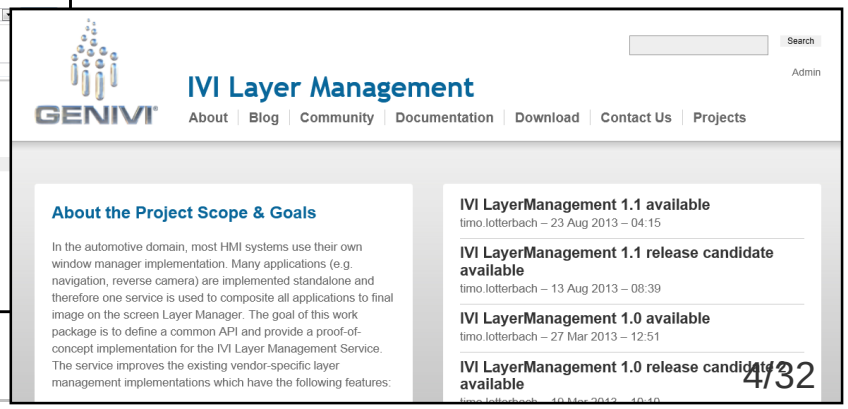
- **Problem:**
  - Coverage of requirements for IVI/Automotive system
  - Quality level on IVI/Automotive system
- **Solution: IVI shell on Weston and GENIVI Layer manager APIs**
  - Support of GENIVI Layer Manager APIs
    - a set of APIs to cover requirements for IVI/Automotive system.
  - Contribute it to major IVI distribution to be used by many users
    - TIZEN IVI
  - Integrate it to Actual product
    - Qualified in product use uses





Weston IVI shell

and

Layer manager APIs

Use cases for IVI shell and Layer manager APIs

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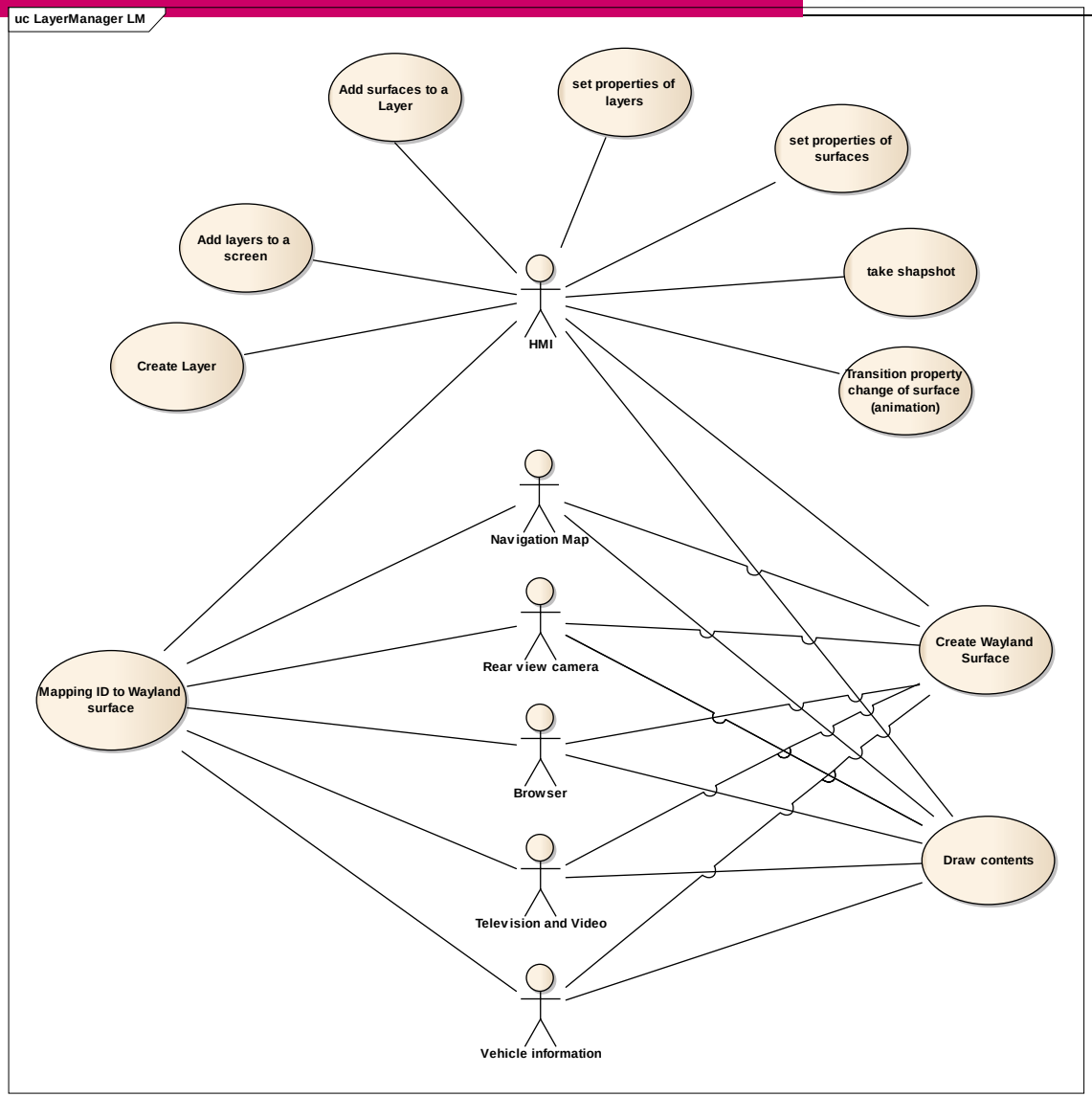

Overview of IVI shell and Layer manager APIs

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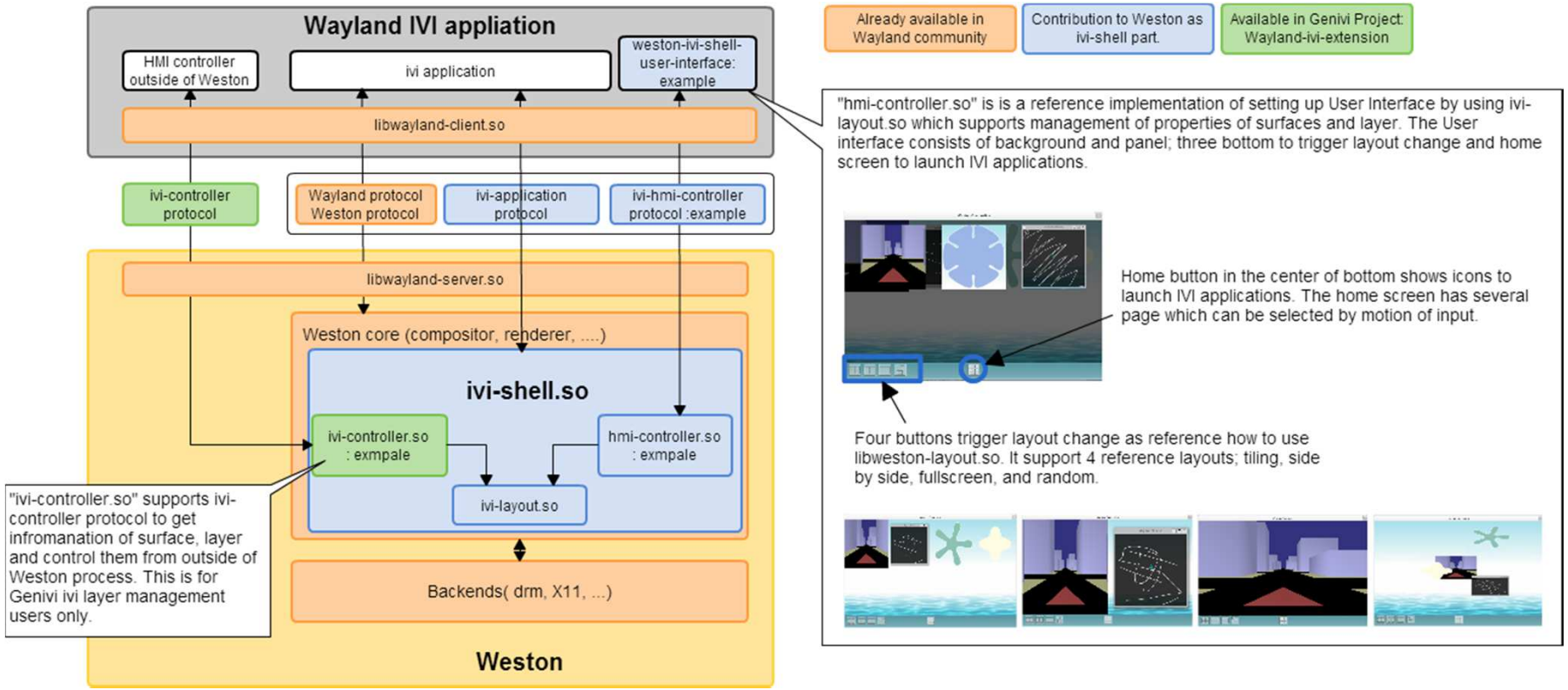

Interfaces

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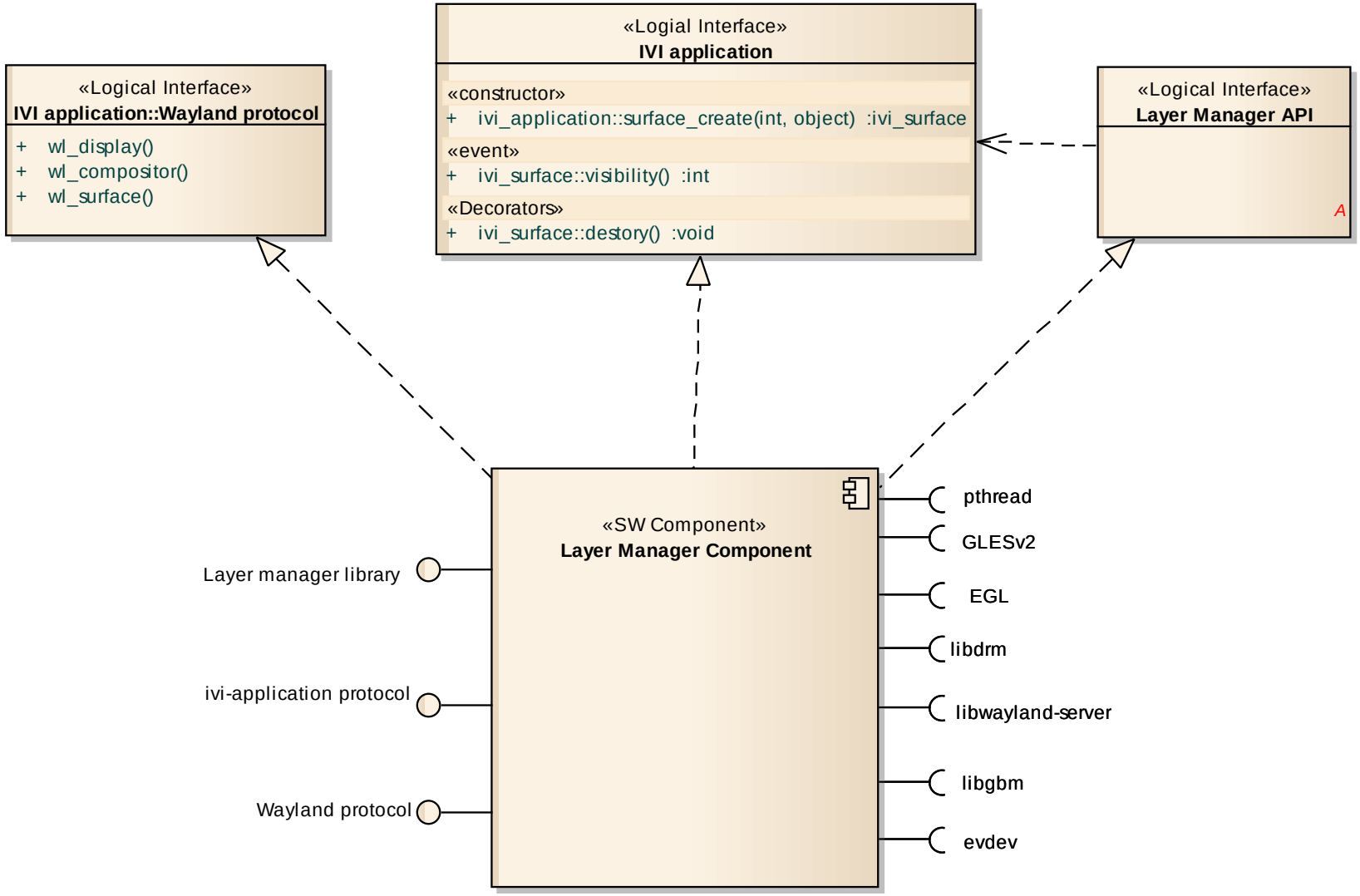
cmp Layer Manager



Component diagram

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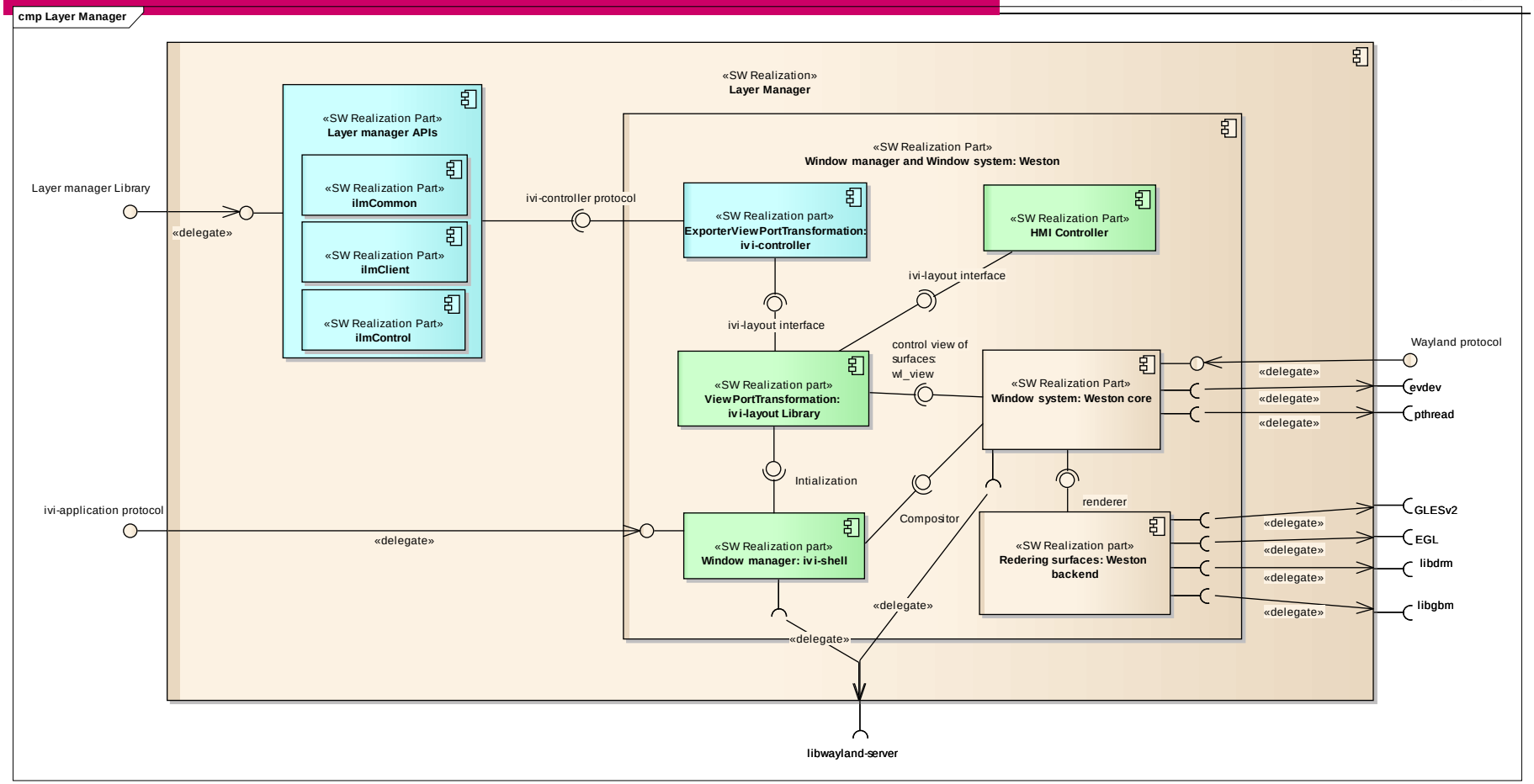

Protocol:

ivi-application

And

Ivi-controller

IVI application/controller protocol

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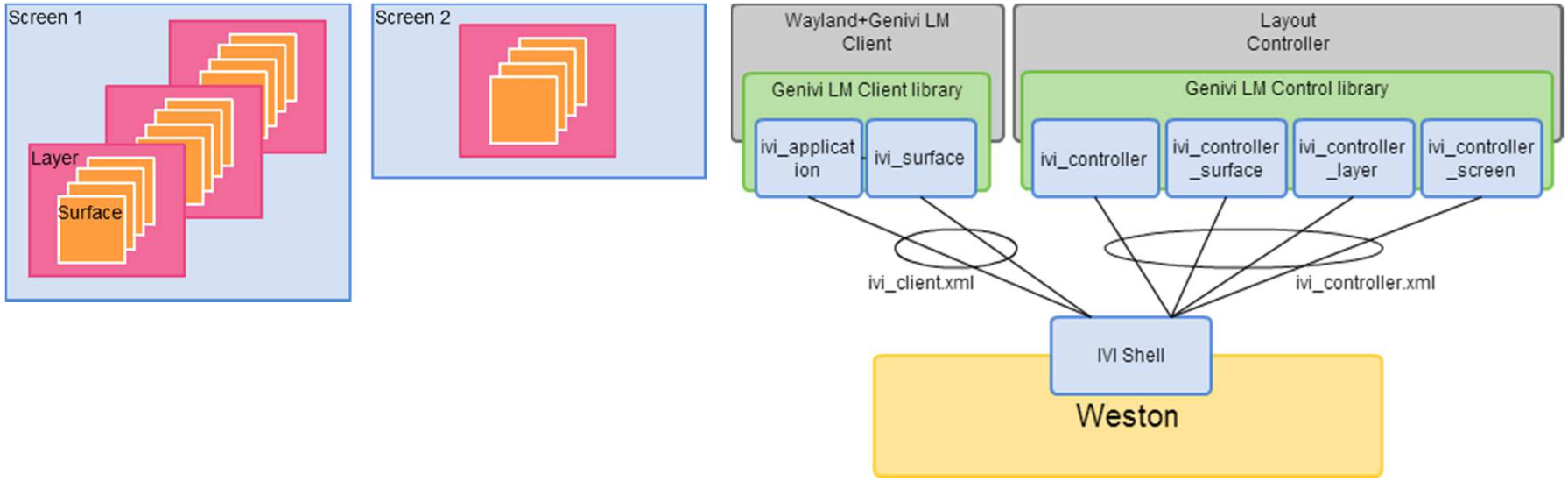
- **Define IVI specific protocol to fit GENIVI layer management; managing surface->Layer->Screen.**
- **Clearly define a role of application and controller.**



IVI Application protocol: ivi-application.xml

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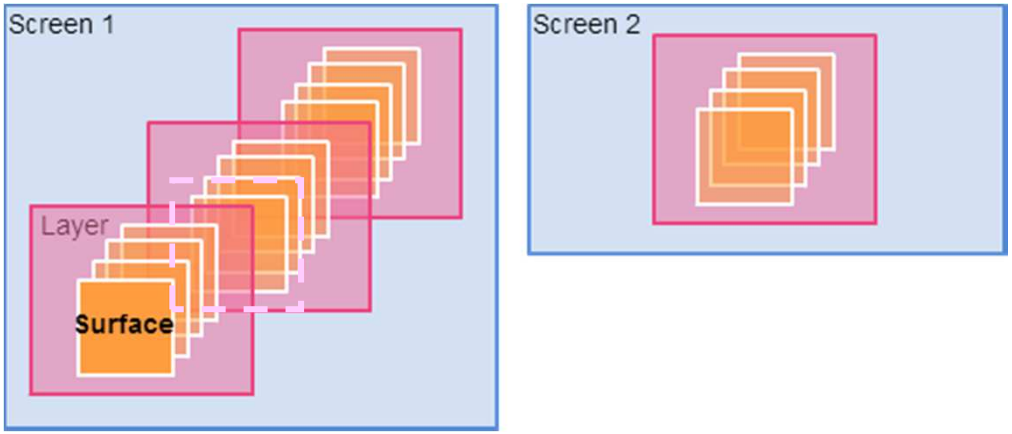
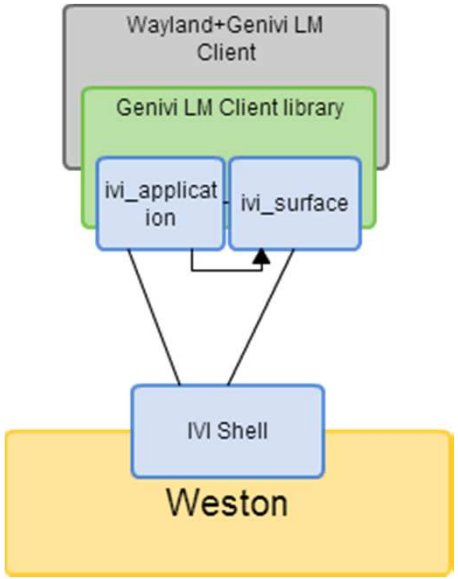
Use case: Wayland application set its native to ivi_surface

- ivi_application: the first protocols for creation of surface.
- ivi_surface: set weston native_handle to ivi_surface

Simple protocol to tie native and ivi_surface with global ID.

Global ID allow us to identify ivi_surface.





ivi-application.xml

- **<interface name="ivi_application" version="1">**
  - <request name="surface_create">
    - <arg name="id_surface" type="uint"/>
    - <arg name="surface" type="object" interface="wl_surface"/>
    - <arg name="id" type="new_id" interface="ivi_surface"/>
  - </request>
- **</interface>**

Simple interface is supported to map wl_surface to Global ID.

IVI controller protocol: ivi-controller.xml

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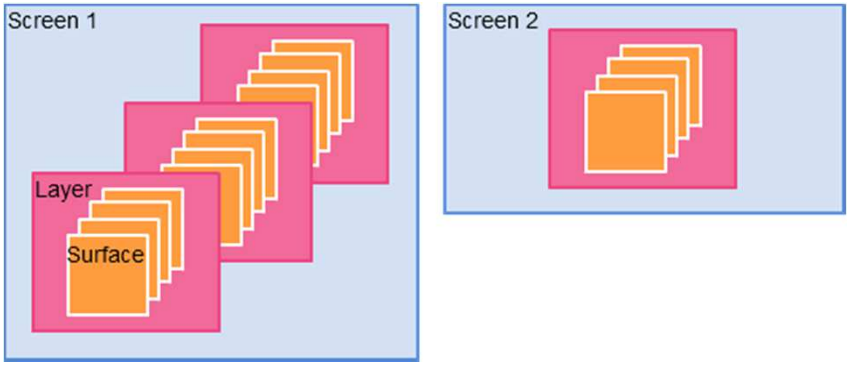
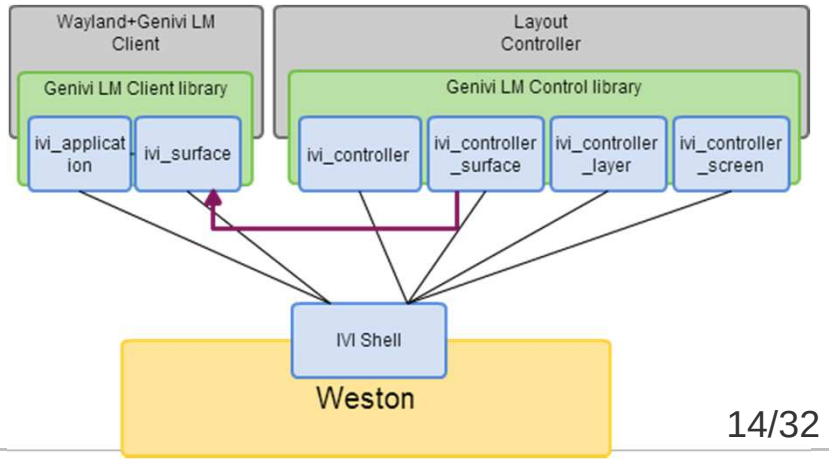
Use case: Create layers, add surfaces to it and control them.

- ivi_controller: the first protocols for receiving events: creation of surface and create layer.
- ivi_controller_surface: set visibility e.g. in case of speed restriction.
- ivi_controller_layer : add/clear surfaces, set visibility, position, ….
- Ivi_controller_screen: add layer to a screen





ivi-controller.xml: ivi_controller

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```
<protocol name="ivi_controller">

 <interface name="ivi_controller" version="1">
      <description summary="Interface for central controller of layers and surfaces"/>
      ...
      <request name="layer_create">
         <description summary="ilm_layerCreateWithDimension"/>
         <arg name="id_layer" type="uint"/>
         <arg name="width" type="int"/>
         <arg name="height" type="int"/>
         <arg name="id" type="new_id" interface="ivi_layer"/>
      </request>

      <event name="layer">
         <description summary="Receive id_layer/ivi_layer and a controller to control ivi_layer"/>
         <arg name="id_layer" type="uint"/>
         <arg name="layer" type="new_id" interface="ivi_layer"/>
         <arg name="controller" type="new_id" interface="ivi_controller_layer"/>
      </event>

      <event name="surface">
         <description summary="Receive id_surface/ivi_surface and a controller to control ivi_surface"/>
         <arg name="id_surface" type="uint"/>
         <arg name="surface" type="new_id" interface="ivi_surface"/>
         <arg name="controller_surface" type="new_id" interface="ivi_controller_surface"/>
      </event>
      ...
```

ivi-controller.xml: ivi_controller_surface

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```
<protocol name="ivi_controller">

  <interface name="ivi_controller_surface" version="1">
      <description summary="Request property change of ivi_surface to server"/>
      ...

      <request name="set_visibility">
         <description summary="Set Visibility"/>
         <arg name="visibility" type="uint"/>
      </request>

      <event name="visibility">
         <description summary="sent in response to set visibility"/>
         <arg name="visibility" type="int"/>
      </event>

      ...

      <event name="layer">
         <description summary="Receive a ivi_layer this ivi_surface belongs"/>
         <arg name="layer" type="object" interface="ivi_layer" allow-null="true"/>
      </event>

      ...
```

ivi-controller.xml: ivi_controller_layer

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```
<protocol name="ivi_controller">
    <interface name="ivi_controller_layer" version="1">
        <description summary="Request property change of ivi_layer and add/remove ivi_surface from ivi_layer to
         server"/>
    …

    <request name="set_visibility">
        <description summary="Set Visibility"/>
        <arg name="visibility" type="uint"/>
    </request>

    …

    <request name="add_surface">
        <description summary="add a ivi_surface to top order of a ivi_layer"/>
        <arg name="surface" type="object" interface="ivi_surface"/>
    </request>

    …

    <event name="screen">
        <description summary="Receive a wl_output this ivi_layer belongs"/>
        <arg name="screen" type="object" interface="wl_output" allow-null="true"/>
    </event>

    …
```

ivi-controller.xml: ivi_controller_screen

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```
<protocol name="ivi_controller">

  <interface name="ivi_controller_screen" version="1">
    <description summary="Request add/remove layer from ivi_layer to server"/>

    ...

    <request name="add_layer">
      <description summary="add a ivi_layer to top order of a wl_output"/>
      <arg name="layer" type="object" interface="ivi_layer"/>
    </request>

    ...
```

Current Status

Supported Features

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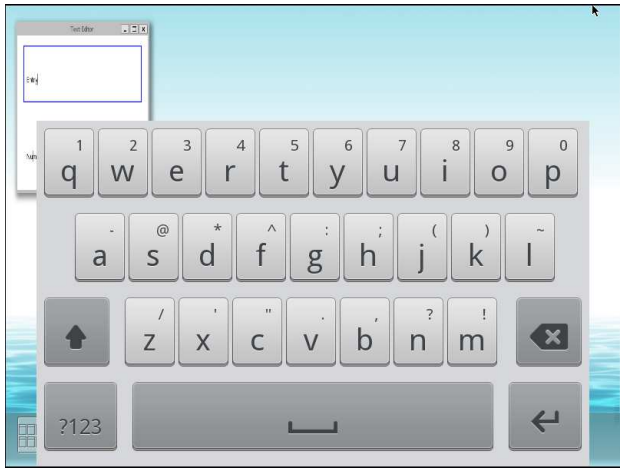
- **GENIVI Layer Manager APIs**
- **New from weston-ivi-shell**
  - Wayland protocol except other shell type; wl_shell and wl_get_shell
  - Input method
  - Transition animation



Where is code?

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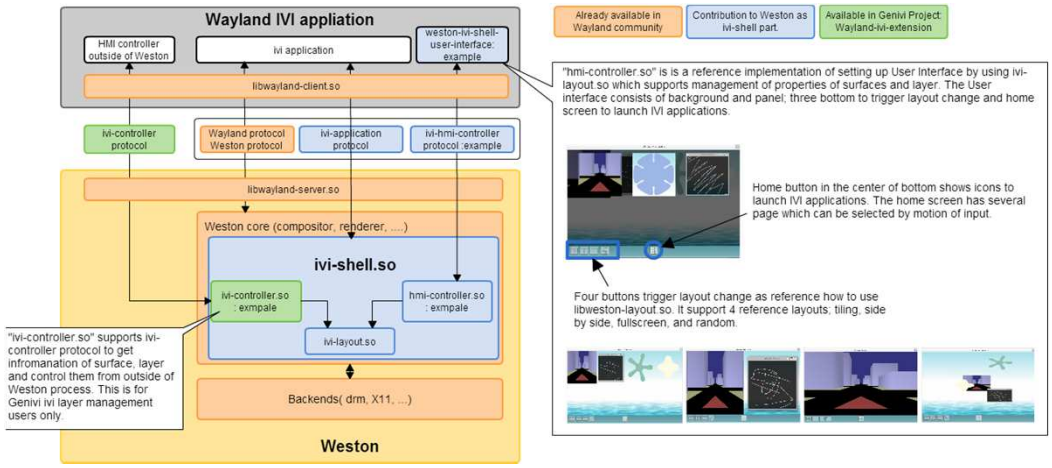
Project page in GENIVI:

http://projects.genivi.org/wayland-ivi-extension/

- **Weston ivi-shell; weston 1.5 patches**
  - https://github.com/ntanibata/weston-ivi-shell/tree/weston-ivi-shell-1.4.93-v3
- **Wayland ivi extension**
  - http://git.projects.genivi.org/?p=wayland-ivi-extension.git;a=summary



How to build?

URL: http://projects.genivi.org/wayland-ivi-extension/documentation

Weston with ivi shell

- Pre-requisition: wayland and other component.
- git clone source and autogen.sh. If there is missing dependency, “configure” will point it.

Wayland ivi extension

- Pre-requisition: weston with ivi-shell
- git clone source and cmake ./ -DBUILD_ILM_API_TESTS=1

How to start?

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- **A reference Weston.ini: <build dir>/ivi-shell/weston.ini**
  - Copy it in $HOME/.config/weston.ini
    - [core]
    - shell=ivi-shell.so

    - [ivi-shell]
    - ivi-module=hmi-controller.so
    - …..
- **Execute "weston"**
  - export XDG_RUNTIME_DIR=/var/run/user/1000
  - /usr/bin/weston

Current status of main stream

- **ivi-shell upstream: Weston 1.5.1 (plan)**
  - Except. To be patched later.
    - Transition animation
    - input method
- **GENIVI: Wayland-ivi-extension:**
  - sanity test available

<u>Thanks to Kritian,Intel and Layer manager Team!!</u>

Current status: TIZEN IVI

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- **One of collaboration project**
  - https://wiki.tizen.org/wiki/IVI/Tizen-IVI_3.0-M2-March2014
  - Wayland-ivi-extension and ivi-shell are integrated
    - https://review.tizen.org/git/?p=profile/ivi/weston-ivi-shell.git;a=summary
    - https://review.tizen.org/git/?p=profile/ivi/wayland-ivi-extension.git;a=summary
  - Sample HomeScreen (*ICO*) with layer management
    - https://review.tizen.org/git/?p=profile/ivi/ico-uxf-homescreen.git;a=summary
    - Developed by TOYOTA daughter company, TTDC

Thanks to TIZEN IVI team. Especially strong support from Ossama Othaman, Intel.

Current status: SoCs

- **No dependent on Architecture and run on major SoCs**
  - Intel: Baytral
  - nVIDIA: TegraK1
  - Renesas: R-Car M2
  - Freescale: imx6

Next Steps

Next Steps: Security Model

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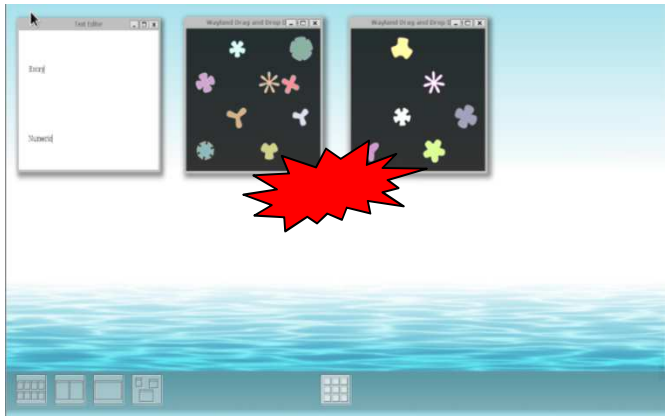
- **ivi-controller protocol shall not be bound by all applications.**
  - Mal-application will damage a Scene graph.
  - The worst case e.g. Television application can show the surface during speed restriction.
- **Proposal**
  - Only processes forked by ivi-controller are allowed to control surface/layer.
  - Or white list or black list



Next Steps: Application Framework

- **If a application framework already support wl_shell or xdg_shell, it might be easy.**
- **Which is preferable?**
  - Qt
  - HTML5
  - Any feedback?

Next Steps: Behavior request from application

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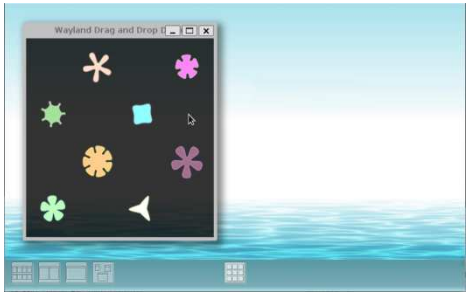
- **An application likes to request the shape of its surface**
  - Full screen
  - Half size of screen. E.g. show route guidance.
  - Popup
  - Etc
  - However, it would be just request. Final decision shall be done by ivi-controller.
- **Proposal**
  - New request needs to be define. Like set_behavior.



Next Steps: Input Focus

- **An application want to receive events e.g. steering switches even if it is located on the top.**
- **Proposal**
  - GENIVI Layer management APIs defines input focus API
  - Focus surface per input devices. E.g. a surface for multi media is set to be focused to receiving volume up/down from steering switches.

Next Steps: Any ideas?

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- **Any feedback is very Welcome in mailing list**
  - Benchmark
  - Collaborating other components e.g. Murphy
  - Etc.

Demonstration

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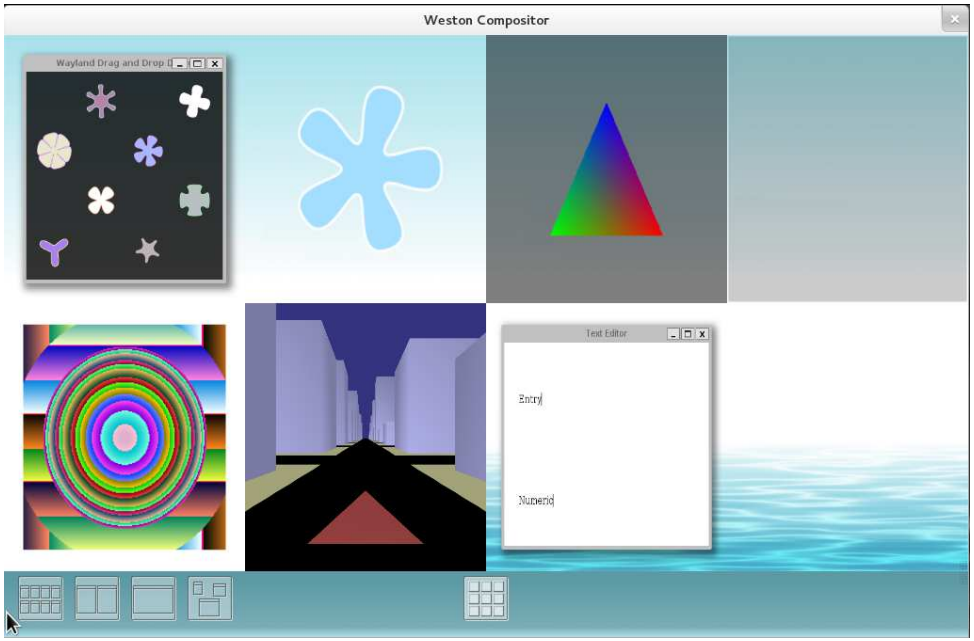
- **Weston-ivi-shell-user-interface**
  - Ivi-application protocol support of sample application
    - Simple-egl/shm, editor, MockNavigation, and so on.
  - Invoked by launcher
- **Reference of changing layout**
  - Internally ivi-layout APIs are used
  - Transition animation



References

- **Wayland**
  - http://wayland.freedesktop.org
  - http://cgit.freedesktop.org/wayland

- **GENIVI**
  - http://projects.genivi.org/wayland-ivi-extension