UInify

A Designer Studio for creating UI Mashups for Ambient Intelligence Environments
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SET PROBLEM

What UInify tries to solve?

2

RELATED WORK

UInify's background

3

ARCHITECTURE

UInify's high-level architecture

4

INTERACTION

UInify's frontend & use cases

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DEMO

UInify live

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EVALUATION

User evaluation results
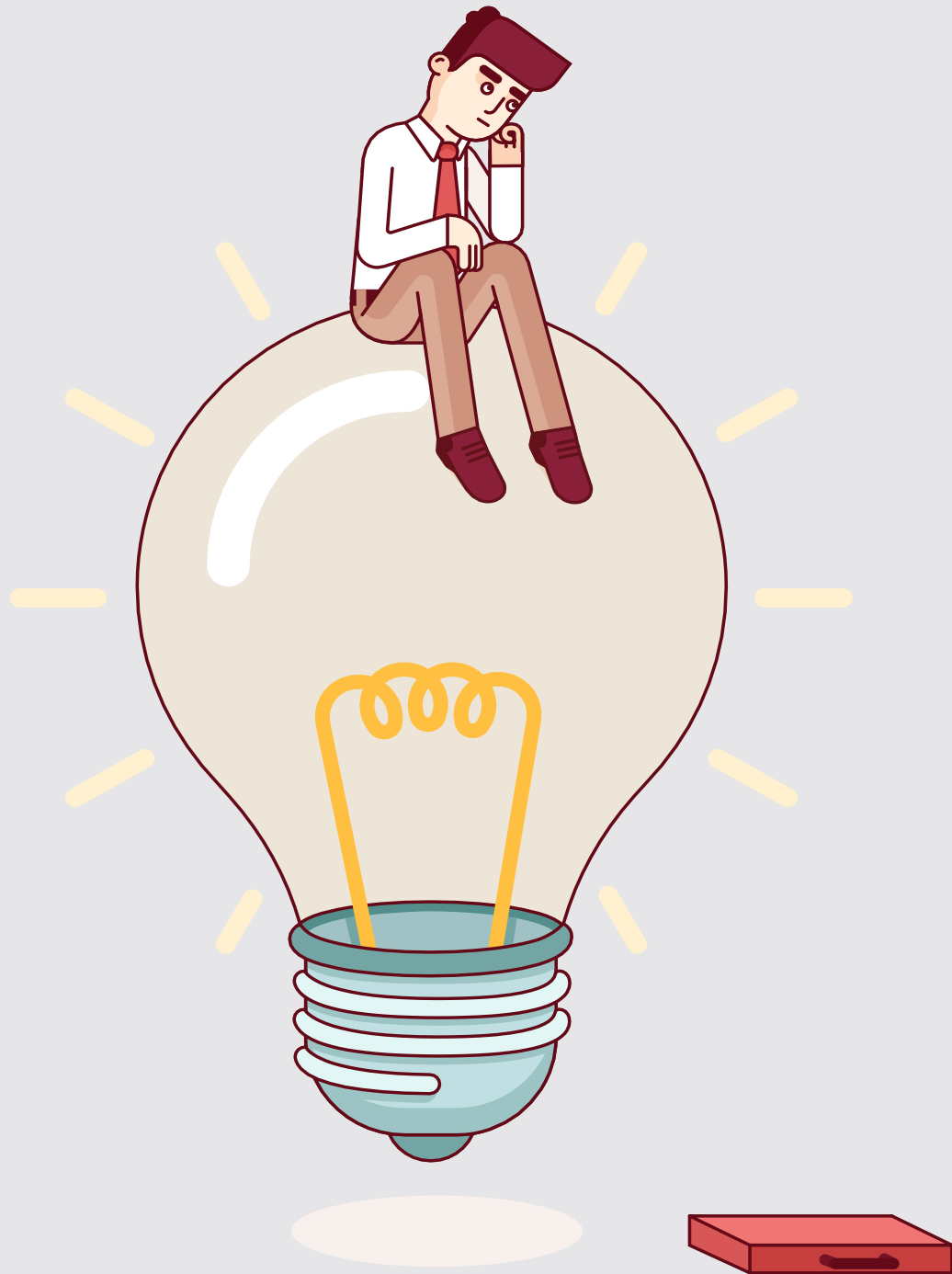
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SUMMARY

Key points of this work

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FUTURE WORK

What's next?

SETTING THE PROBLEM
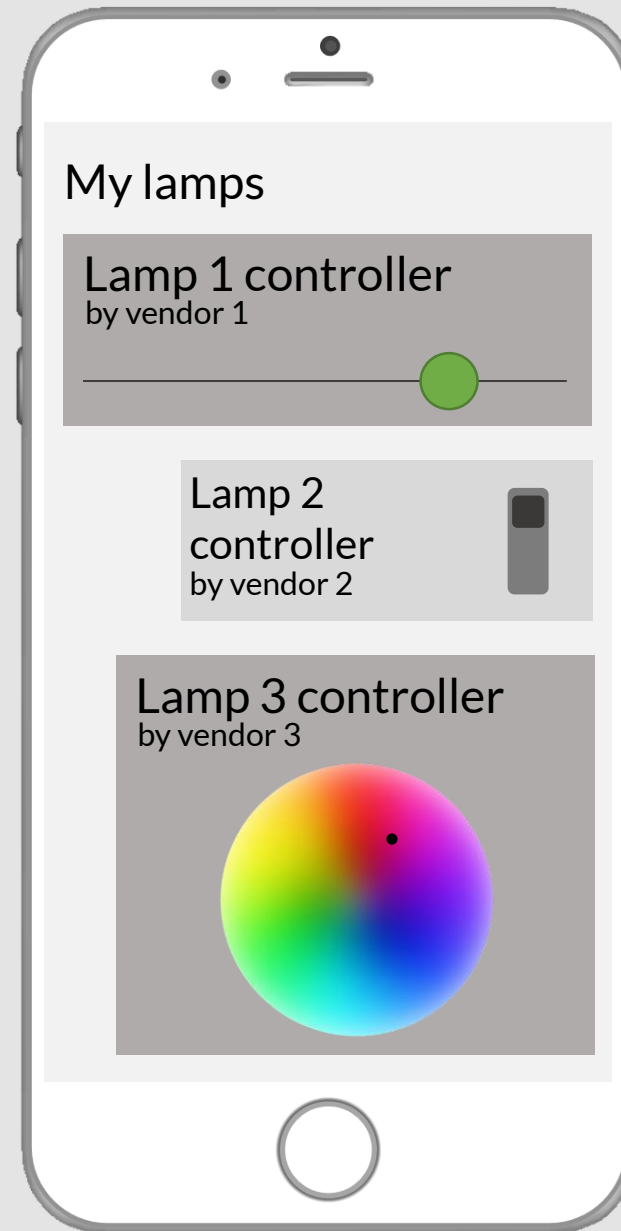
Users need to either rely on **diverse** applications from **different** vendors to accomplish their goals

… or users have to resort to **integration** platforms.

Resulting in:

➤ limited functionality
➤ poor interaction

in favor of interoperability…

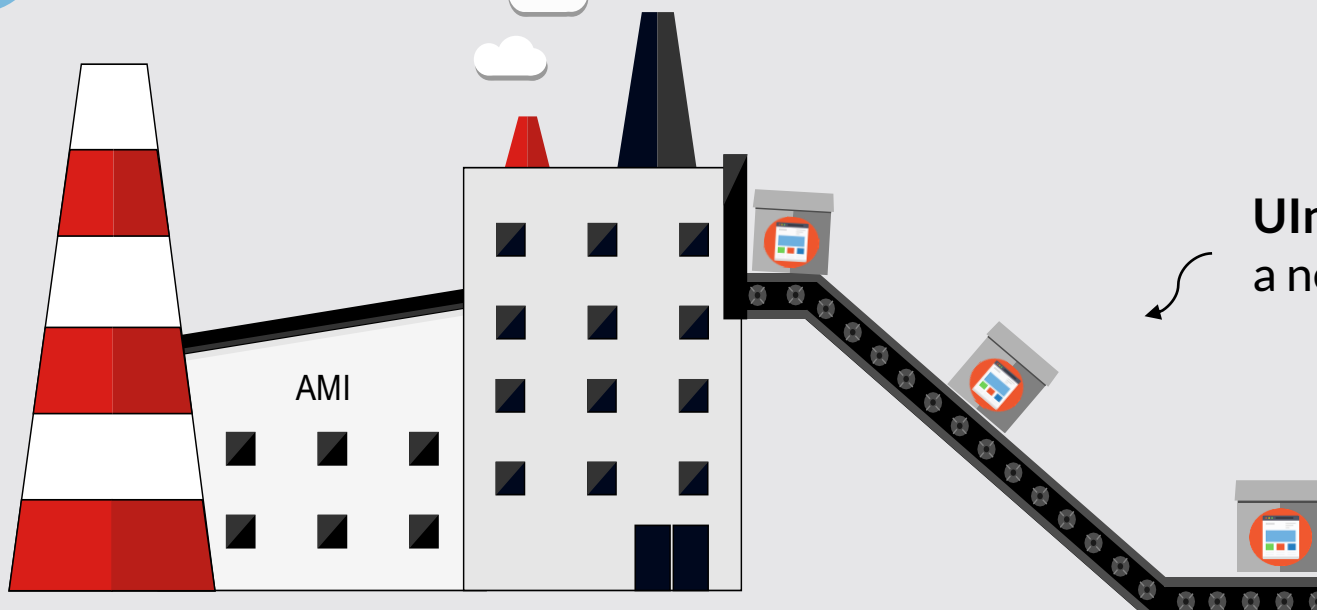It is **impossible** for developers to build

all-inclusive applications

due to the abundance of smart devices and services.

1. composes **flexible** web applications in **real-time**

2. **aggregate** all the individual UIs of a smart environment

3. introduces **new rich user interface** compositions

Input:
individual
application UIs

UInify's output:
a new rich composite UI

AMI

is a **web platform**. Why?

Progressive Web Apps (PWA) are **user experiences** that have the reach of the web.
–*Google Developers*

PWA offer engaging experiences using the web, but as **reliable** and **integrated** as a native application

PWA are based on: JS, HTML, and CSS.

UINIFY

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... uses **Angular 2+** for front-end and **Node.JS** for back-end. Why?

Node.js and **Angular** are the most commonly used technologies in Web Development

Frameworks, Libraries, and Tools

Developer Survey Results, **2018, StackOverflow**

All Respondents | Professional Developers

Node.js   49.6%

Angular   36.9%

React   27.8%

.NET Core   27.2%

Spring   17.6%

UINIFY

RELATED WORK

AMBIENT INTELLIGENCE

- Empowers users to create **personalized** and **context-aware** interactions

- Equips an environment with technology, that operates **collectively**, using sensor data, and **intelligently,** which is hidden in connected devices.

Maniac (2018)

The electric house (1922)
BUSTER KEATON and VIRGINIA FOX

Ironman(2008)

Big Hero 6 (2014)

Back to the future 2 (1989)

The Jetsons (1963)

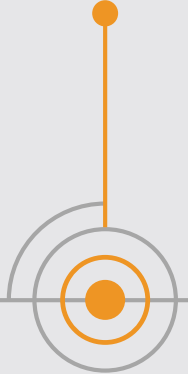Minority Report (2002)

Smart Home(1999)

Star Wars (1977-2018)

RELATED WORK

MILESTONES IN HOME AUTOMATION

Research and commercial projects
such as House_N, mavHome etc

SmartThings promised to
connect every device in a home

1966

2010

2014

90's

2012

Origin: ECHO IV & 'The kitchen
Computer' by Jim Sutherland

Nest Labs with their products start a
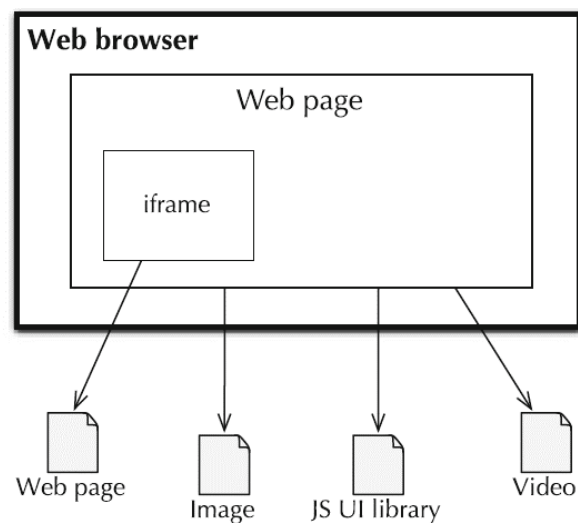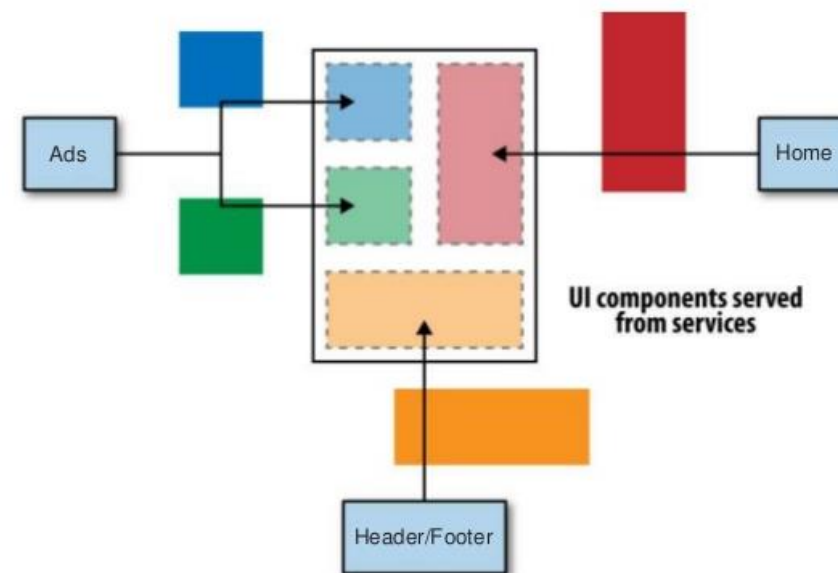wave of mobile applications

The first unified
controllers
start to emerge

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UI & UI HTML MASHUPS

UI mashups combine various components at the presentation layer, while reusing data and synchronization elements from the involved UIs.

HTML UI mashups consist of an HTML page, which may incorporate (via iframes):
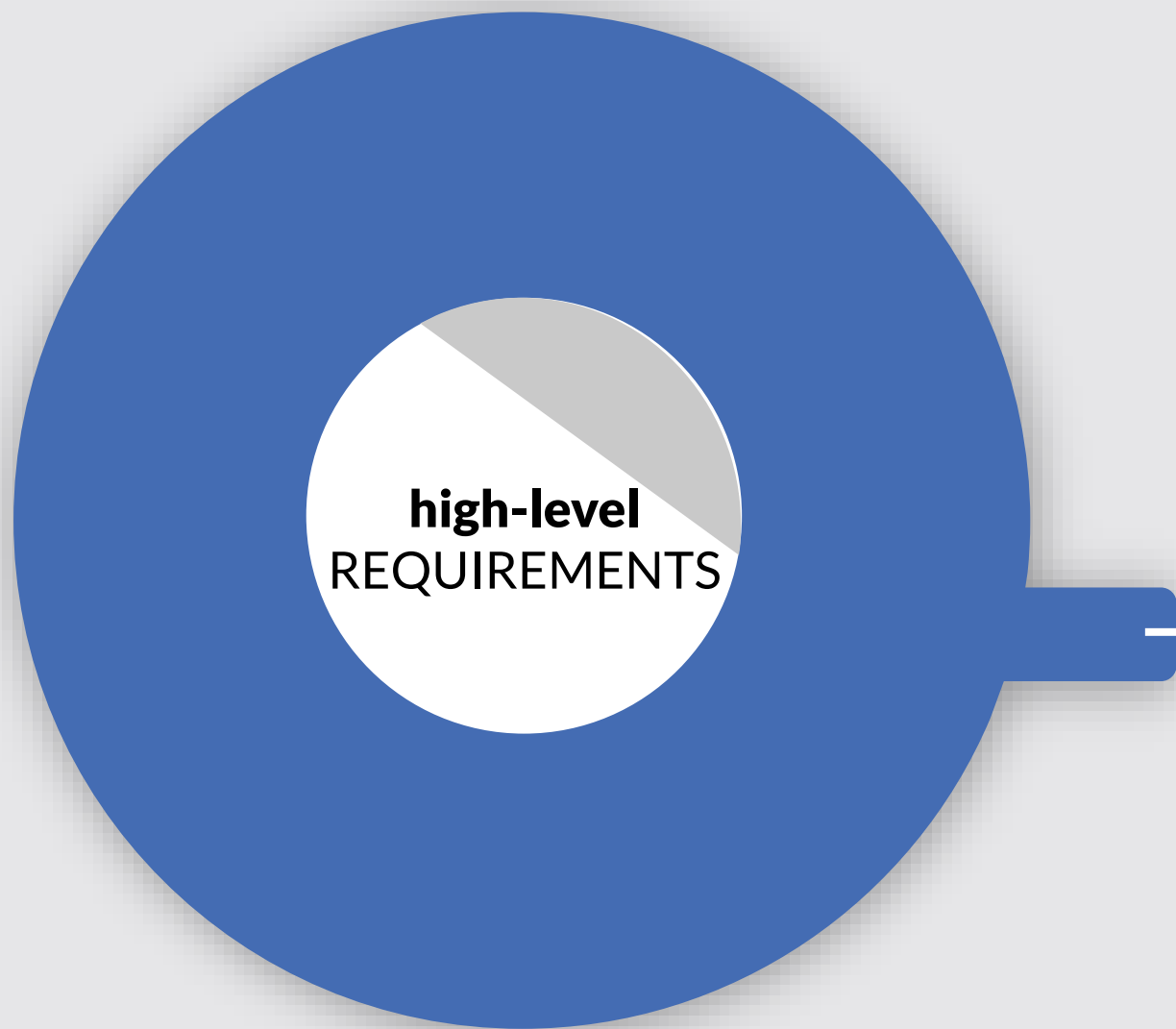- entire web pages
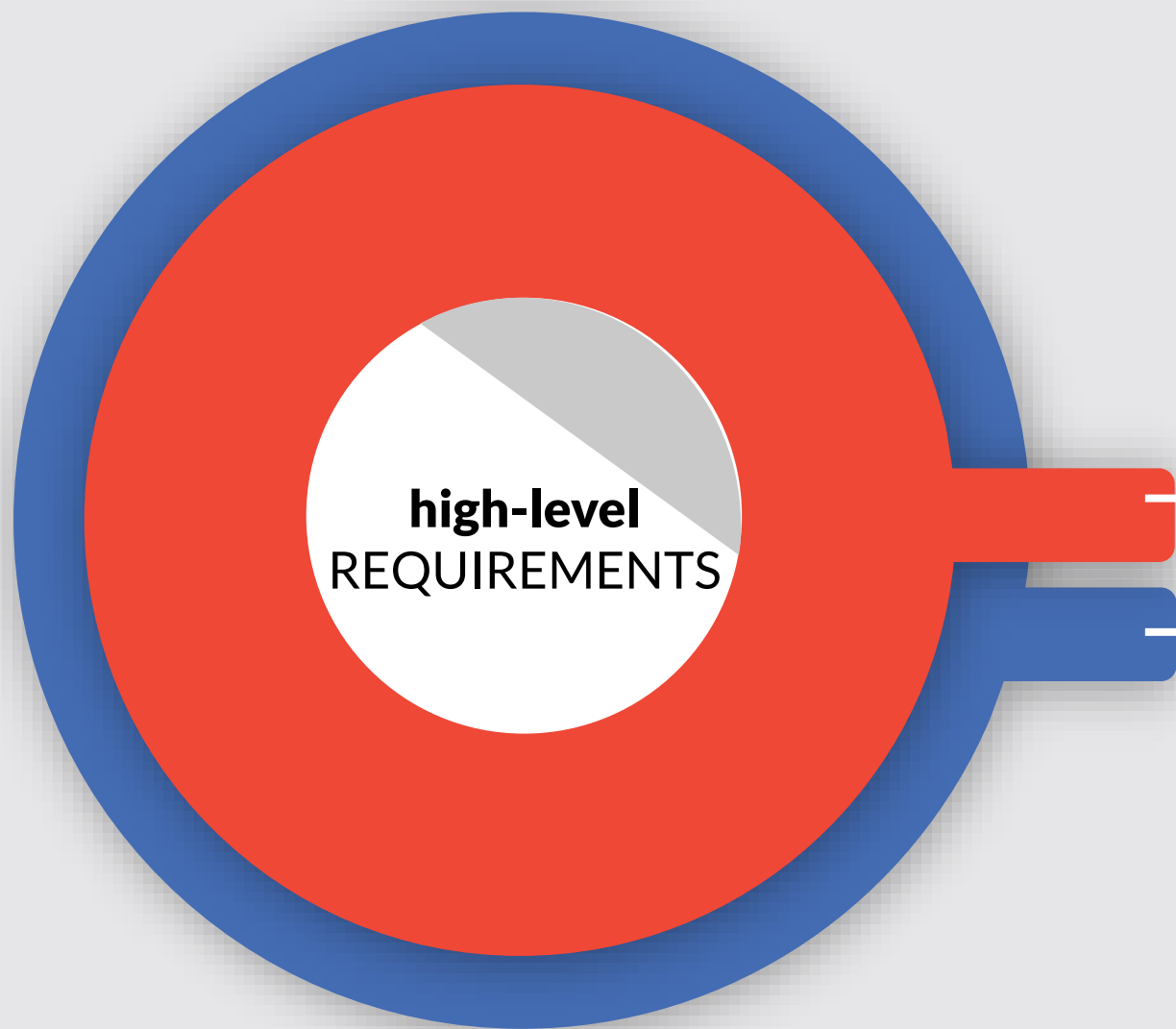- multimedia
- other web components
- etc.

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ARCHITECTURE

high-level
REQUIREMENTS

SUPPORT DIVERCE DEVICES
UInify should support multiple stationary and portable devices with diverse technical characteristics

UI FUSION
UInify should compose at real-time adaptable interfaces, which control the hardware and software components of an intelligent space

SUPPORT DIVERCE DEVICES
UInify should support multiple stationary and portable devices with diverse technical characteristics

HIGH-LEVEL ARCHITECTURE

HIGH LEVEL REQUIREMENTS

USER EXPERIENCE
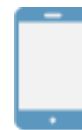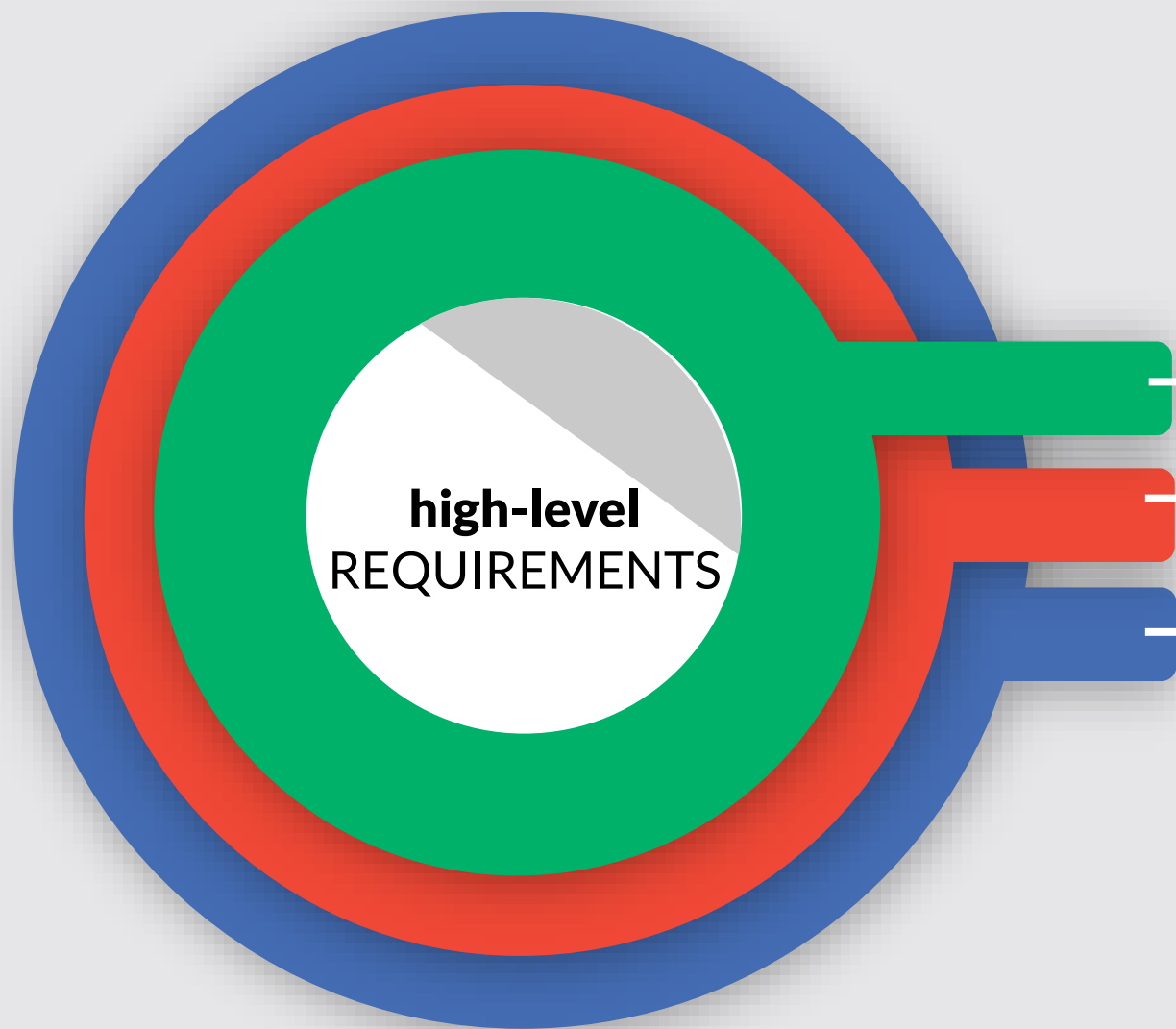UInify should deliver a consistent and concise Look'n'Feel across all devices

UI FUSION
UInify should compose at real-time adaptable interfaces, which control the hardware and software components of an intelligent space

SUPPORT DIVERCE DEVICES
UInify should support multiple stationary and portable devices with diverse technical characteristics

HIGH LEVEL REQUIREMENTS

USER EMPOWERMENT
Users should be able to easily customize the mashups according to their needs
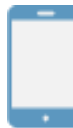
USER EXPERIENCE
UInify should deliver a consistent and concise Look'n'Feel across all devices
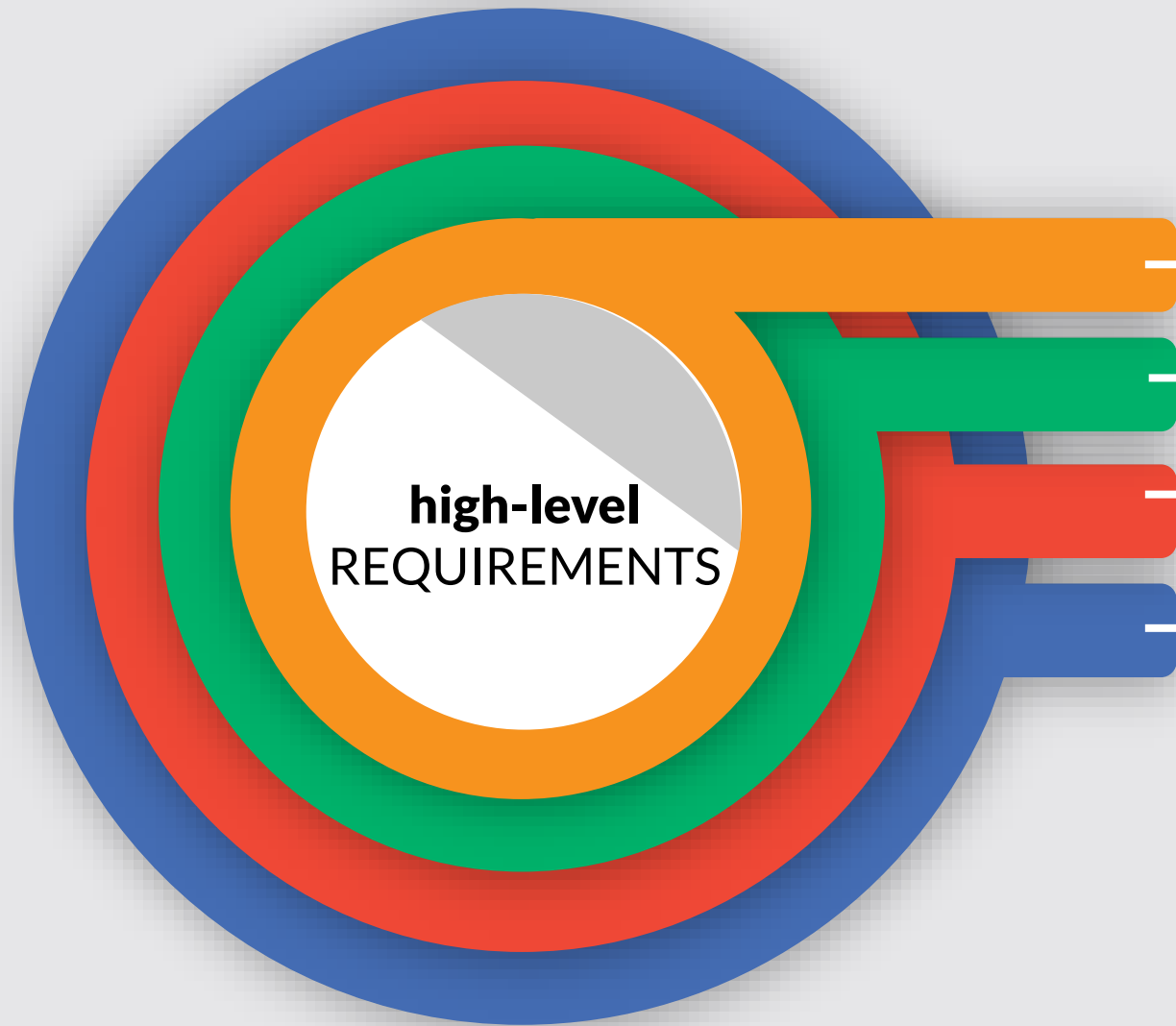
UI FUSION
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SUPPORT DIVERCE DEVICES
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high-level
REQUIREMENTS

LAYOUT BUILDER & UI MAPPER

Layout repo

Layout builder

Create a layout from scratch

OR

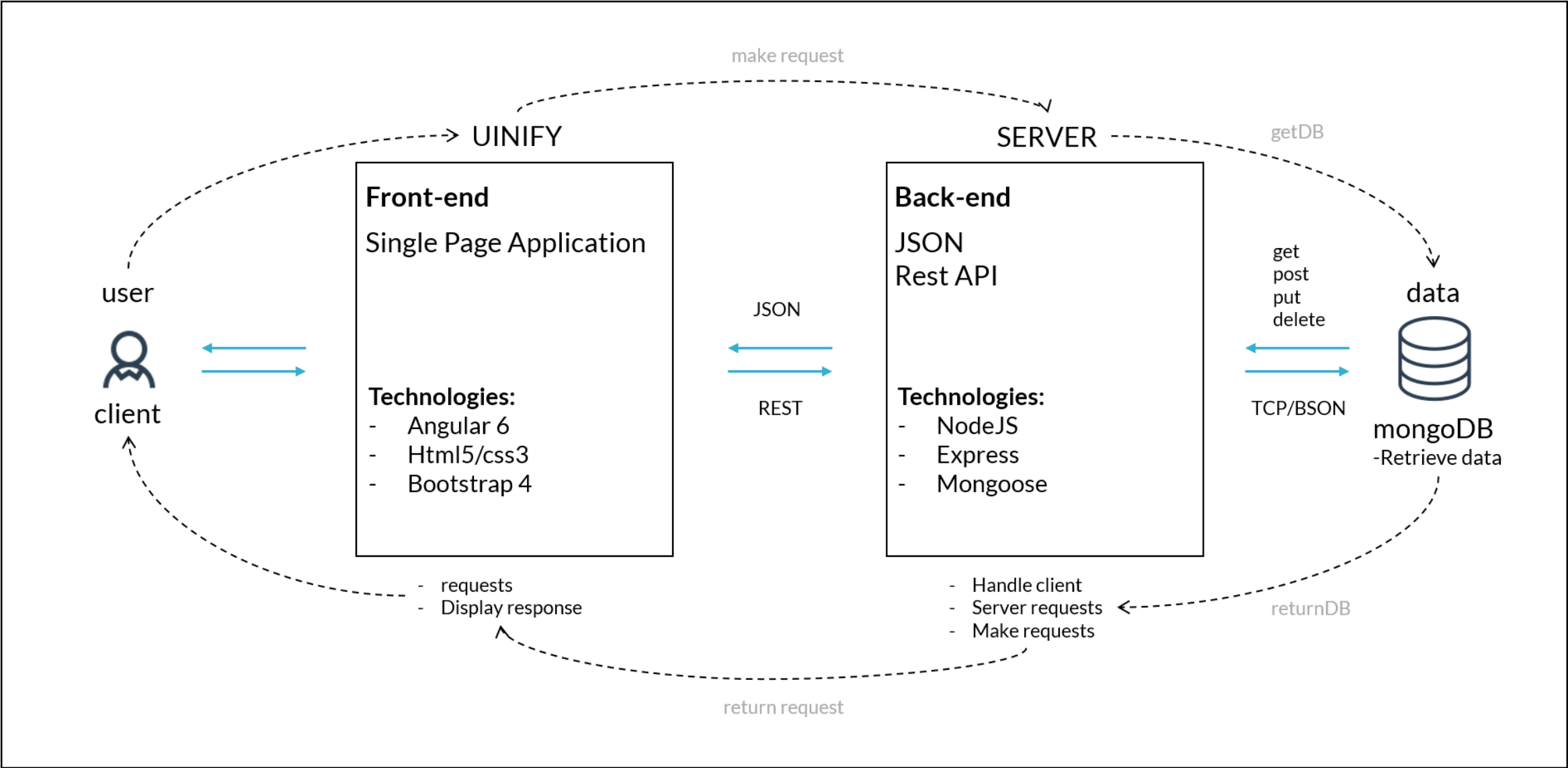Load a layout from repository

UI repo

UI mapper

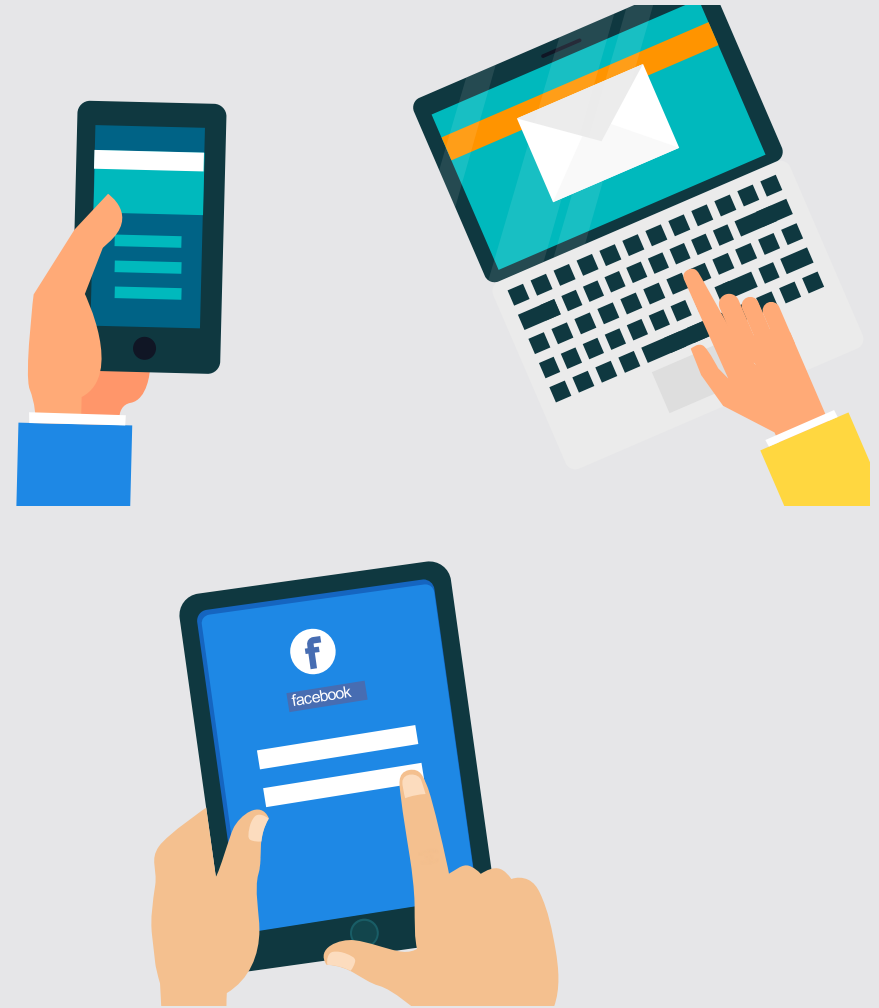Import UIs to cells created in Layout builder

Layout builder, where the user can build the layout for the mashup.

UI Mapper, where the mapping of layout cell and web application occurs.

UINIFY MEAN STACK

make request

getDB

UINIFY

SERVER

Front-end

Single Page Application

user

client

Technologies:
- Angular 6
- Html5/css3
- Bootstrap 4

JSON

REST

Back-end

JSON
Rest API

Technologies:
- NodeJS
- Express
- Mongoose

get
post
put
delete

data

TCP/BSON

mongoDB
-Retrieve data

- requests
- Display response

- Handle client
- Server requests
- Make requests

returnDB

return request

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INTERACTION

CREATE COMPOSITION

STEP 1

Create a new composition

STEP 2

Select intelligent space (i.e. AMIHOME)

CREATE NEW COMPOSITION
Choose Intelligent Space

AmiGarden
Some description

CREATE NEW COMPOSITION

AMIHOME
AMI description

CREATE NEW COMPOSITION

Cognitus
Some description of classroom

CREATE NEW COMPOSITION

CREATE NEW COMPOSITION

Choose room

Living Room

Kitchen

Bathroom

STEP 3

Select room (i.e. Living room)

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CREATE NEW COMPOSITION

Type name *

AMITV Launcher

✕

Select Primary Tag

Entertainment ▾

Select Secondary Tag

General ▾

Choose device Type

🖵

Large Screen

Choose device

TV1 ▾

CREATE COMPOSITION   CANCEL

STEP 4

Fill in basic information

UI
nify

Search for... 🔍   Administrator ▾

🏠 / Compositions / AMITV Launcher

dashboard

AMITV LAUNCHER

compositions

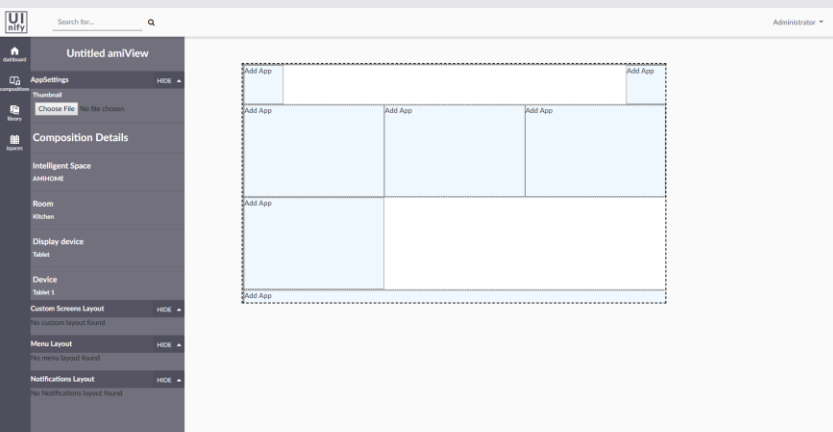LIVING ROOM | LARGE SCREEN

Entertainment   General

library

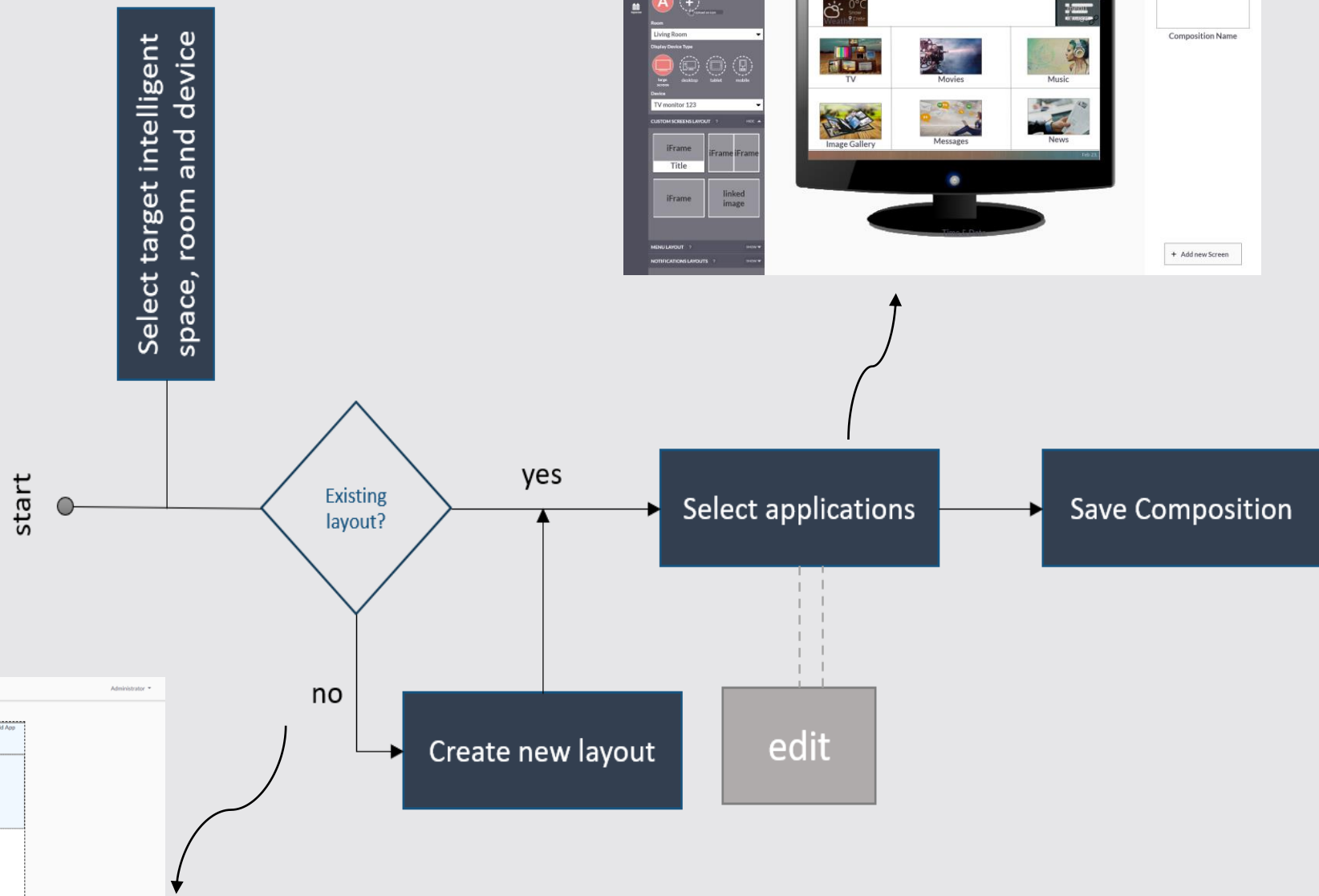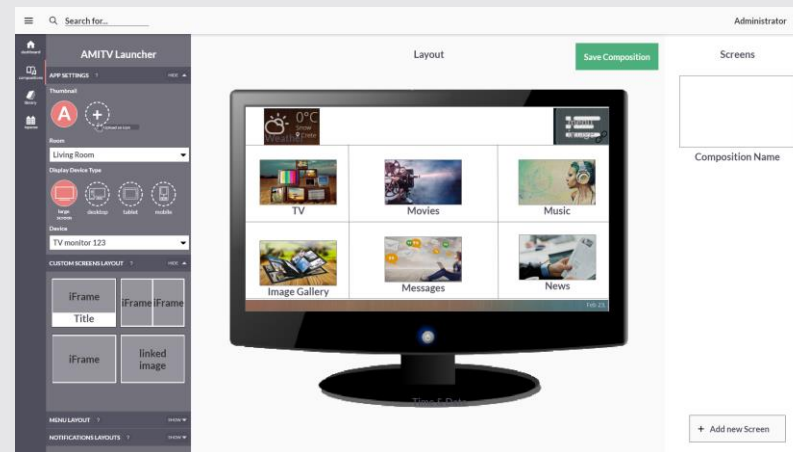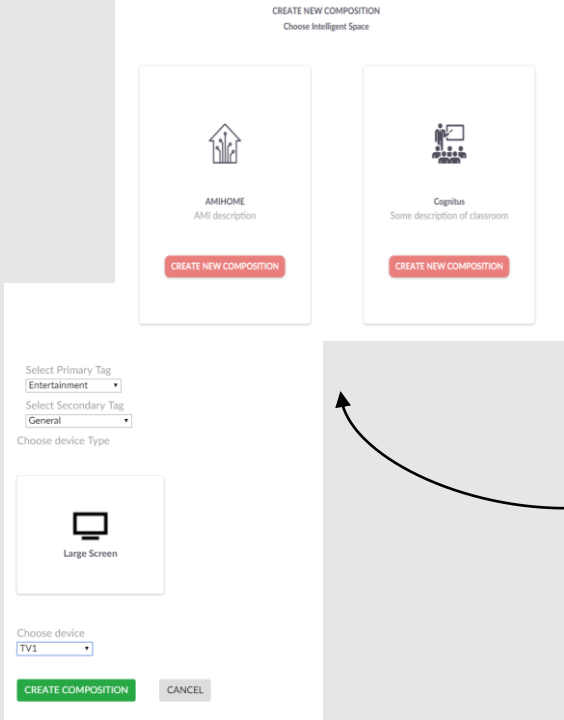🗑   ➕

ispaces

⊞ ☰   Sort By ▾   Search for...

+ Create Static Layout

No Amiviews found

STEP 5

The final Composition

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start

Select target intelligent space, room and device

Existing layout?

yes

no

Select applications

Save Composition

Create new layout

edit

USE CASES FOR SMART HOME
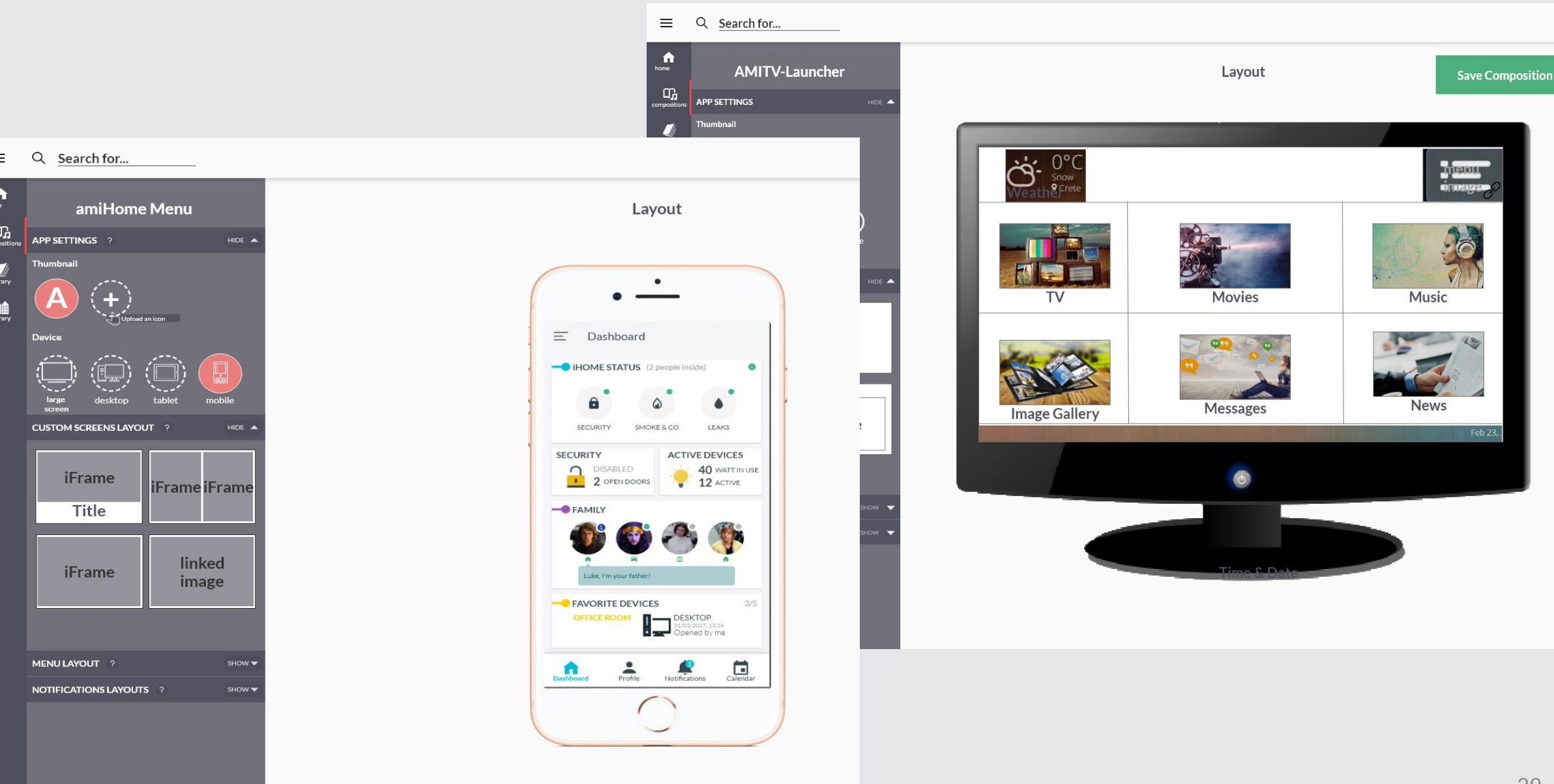
USE CASE IN SMART CLASSROOM
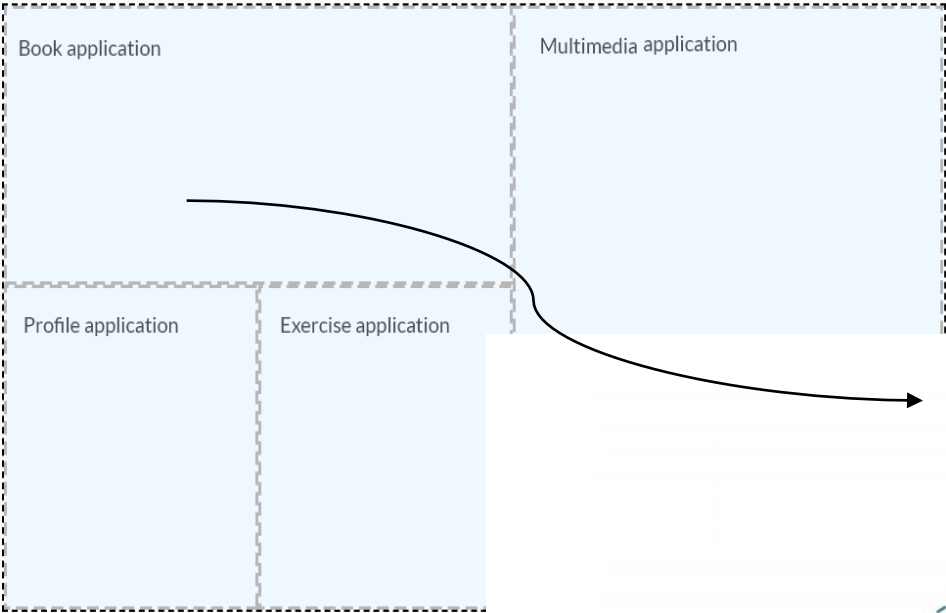
LIVE DEMO
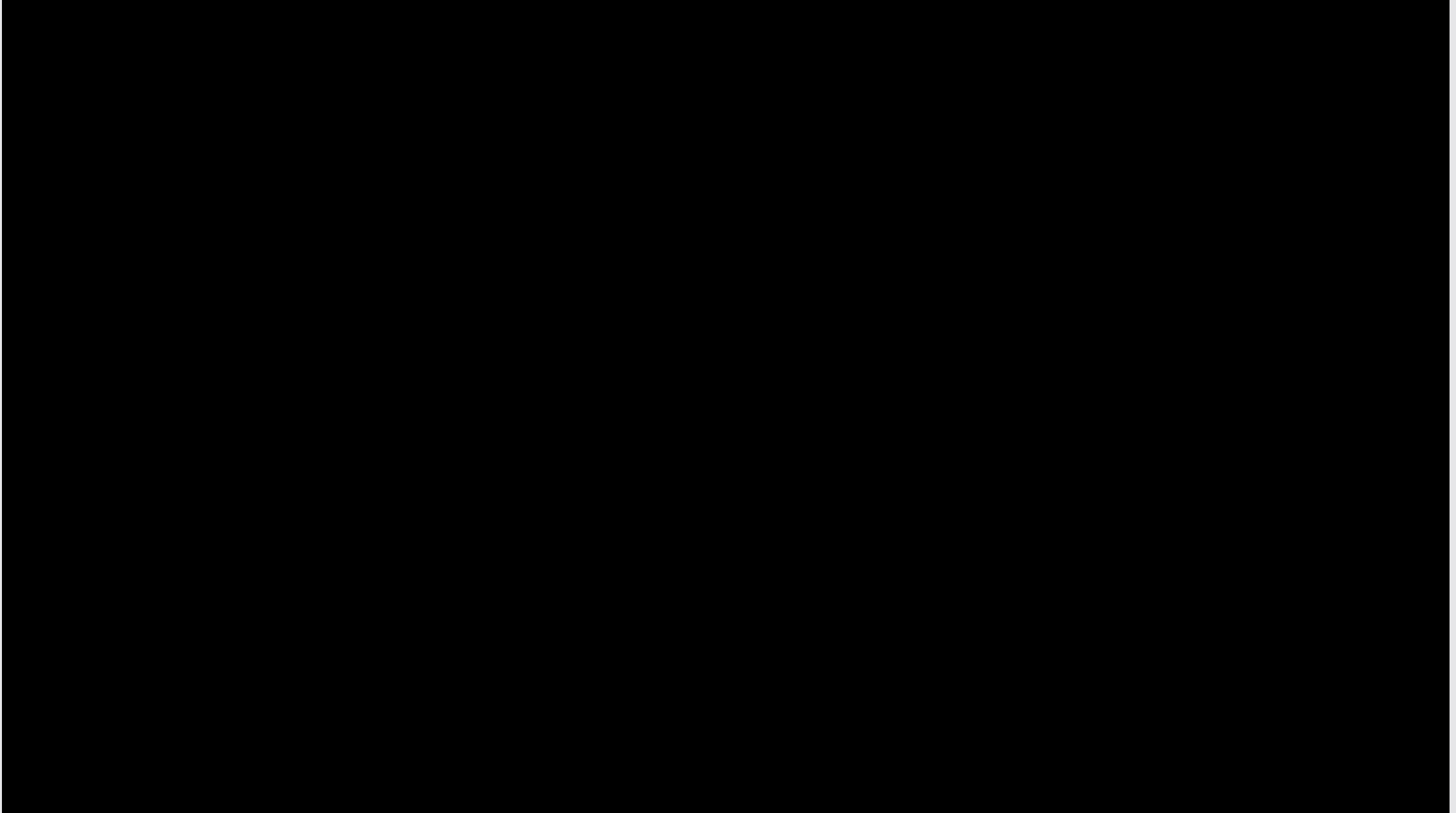
EVALUATION

USER BASED EVALUATION

Evaluate the usability of the system
- Ease of use
- Ease of Learning
- User Acceptance

5 Users can identify the **85%** of design flows, in the first evaluation iteration [Norman]
- 3 males & 2 females
- 1 expert, 3 with moderate experience and 1 with a little experience in AmI environments

9 Scenarios
- Covering the main functionality of UInify

✓ UInify was **easy to use**

✓ Users thought that the design **was simple and intuitive**

✓ Even users with little AmI experience, were able **to successfully complete** the tasks

✓ All users suggested that **they would use it**, if the appropriate infrastructure was well defined

E V A L U A T I O N

- Terminology should be revised

- The system should be automatically personalized according to user preferences

- **Layout Builder** should be enriched with drag and drop, adjustable columns, recommendations and undo-redo functionality

- **UI mapper** should:
    - provide live feedback
    - support edit/delete functionality

EVALUATION

CONCLUSION

FUTURE WORK

This thesis proposed **UInify**

(i) creates **unified UIs** made from pluggable applications that exist in the ecosystem
(ii) stores and deploys the compositions as **HTML UI mashups**

Use Cases: UInify can aid in the design and development of Smart home and other Ambient Intelligent Environments

Preliminary Evaluation Findings: the system is easy-to-use, but we need to redesign some features for a better UX

More research can be conducted to improve the current functionality of UInify platform

Short-term goals:

- Incorporate **UInify player** to load the compositions

- Revise **Layout builder** and **UI mapper**

- Introduce **dynamic rules** to automate the compositions and aid the user

Long-term goals:

- Expand UInify player to support fluidity (i.e. flexible UIs)

- Validate the usage of common style guides among the imported applications

THANKS

QUESTIONS?