

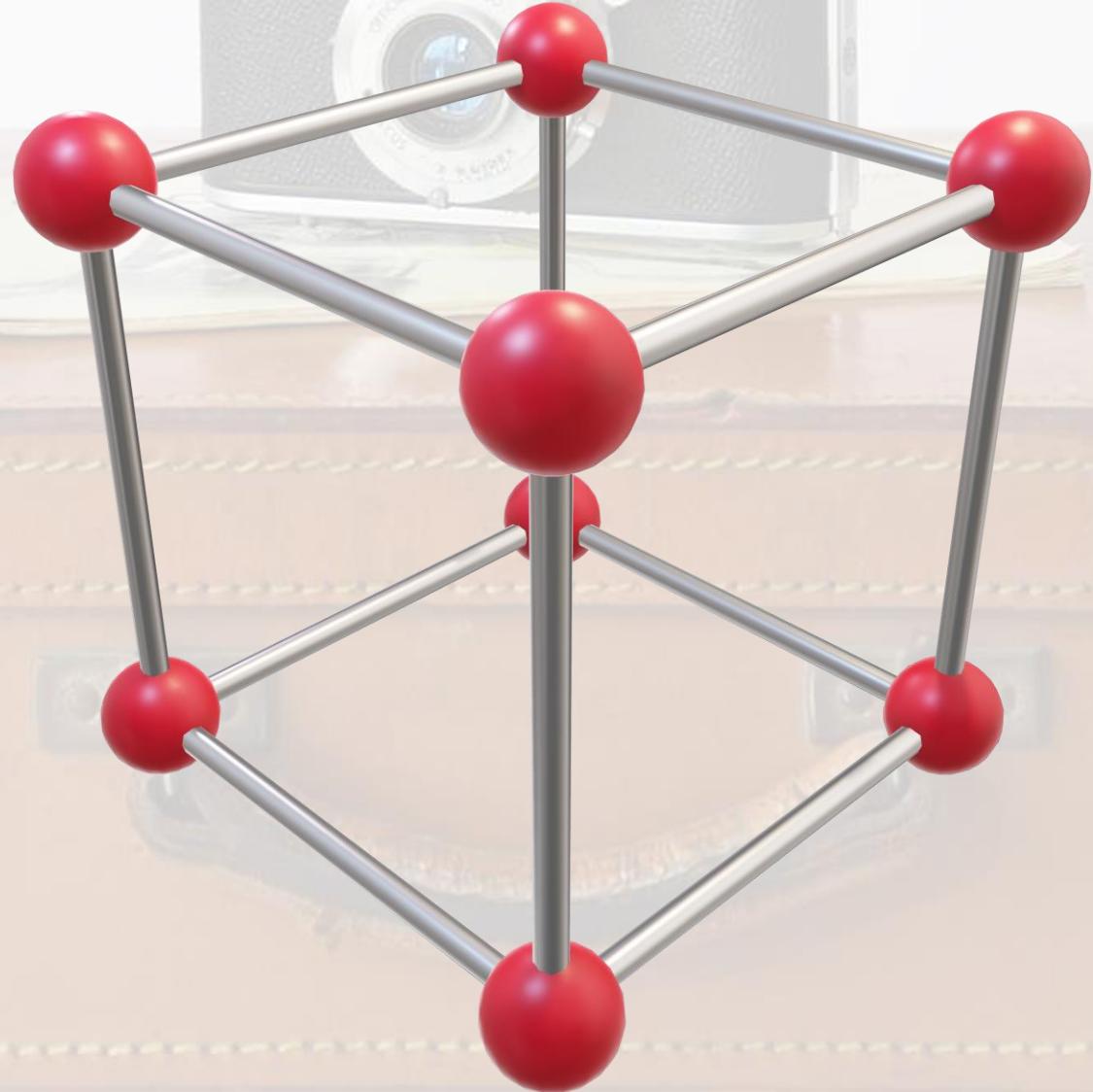




I pack my suitcase and take with me...







# Model-Based Systems Engineering – “How to pack my suitcase right?”



**Susan Faust**

PreSales Solution Consultant Polarion (ALM)

[susan.faust@siemens.com](mailto:susan.faust@siemens.com)

+49 (0) 174 2038 991



**Dr. Chantal Sinnwell**

Solution Architect (MBSE & MBPE)

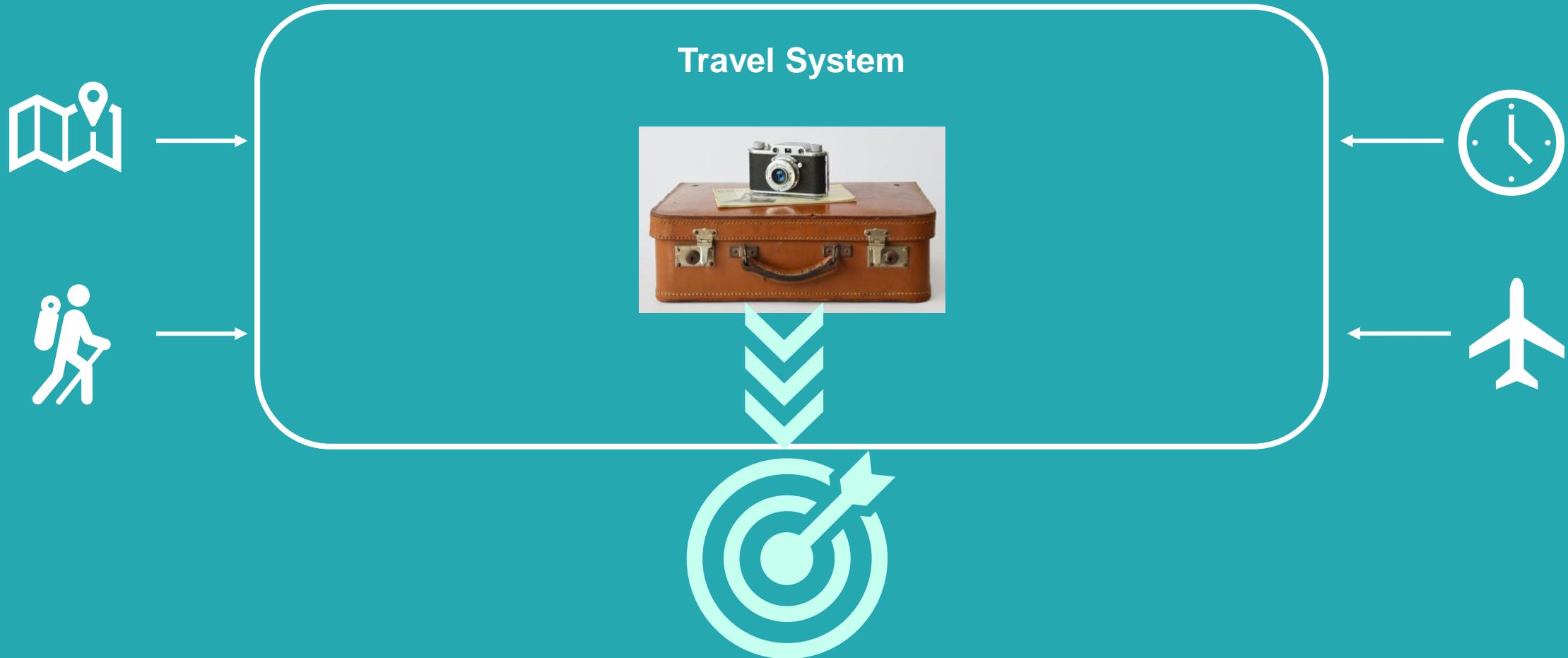
[chantal.sinnwell@siemens.com](mailto:chantal.sinnwell@siemens.com)

+49 (0) 172 6927 550

**SIEMENS**

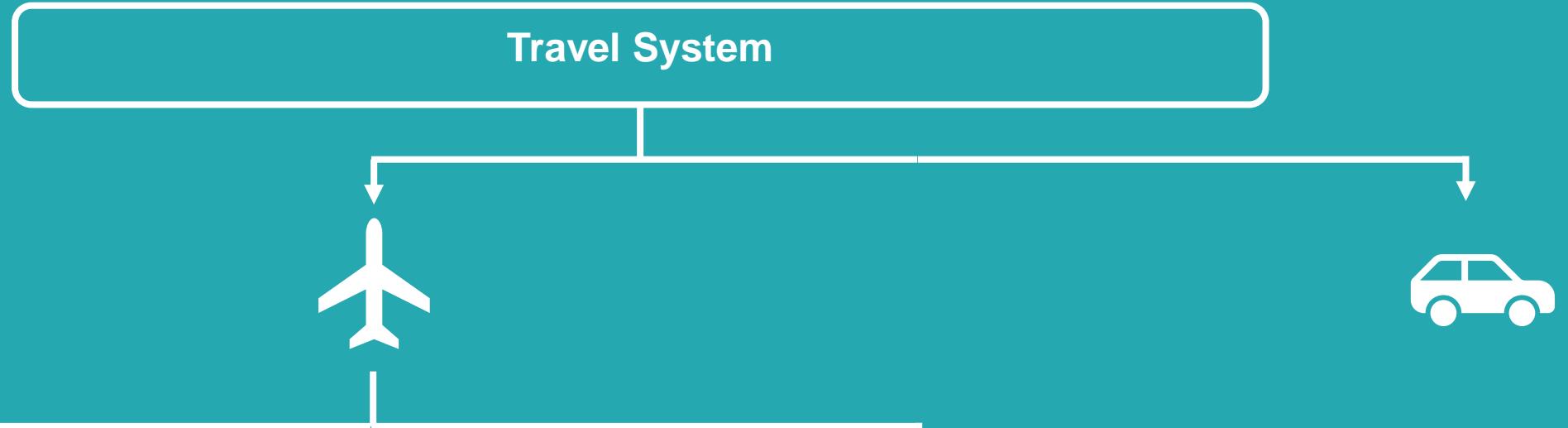
**Let's imagine we see our suitcase also as a system...**

Travel System as a Black Box influenced by different external factors



# Travel System as a White Box with different sub systems

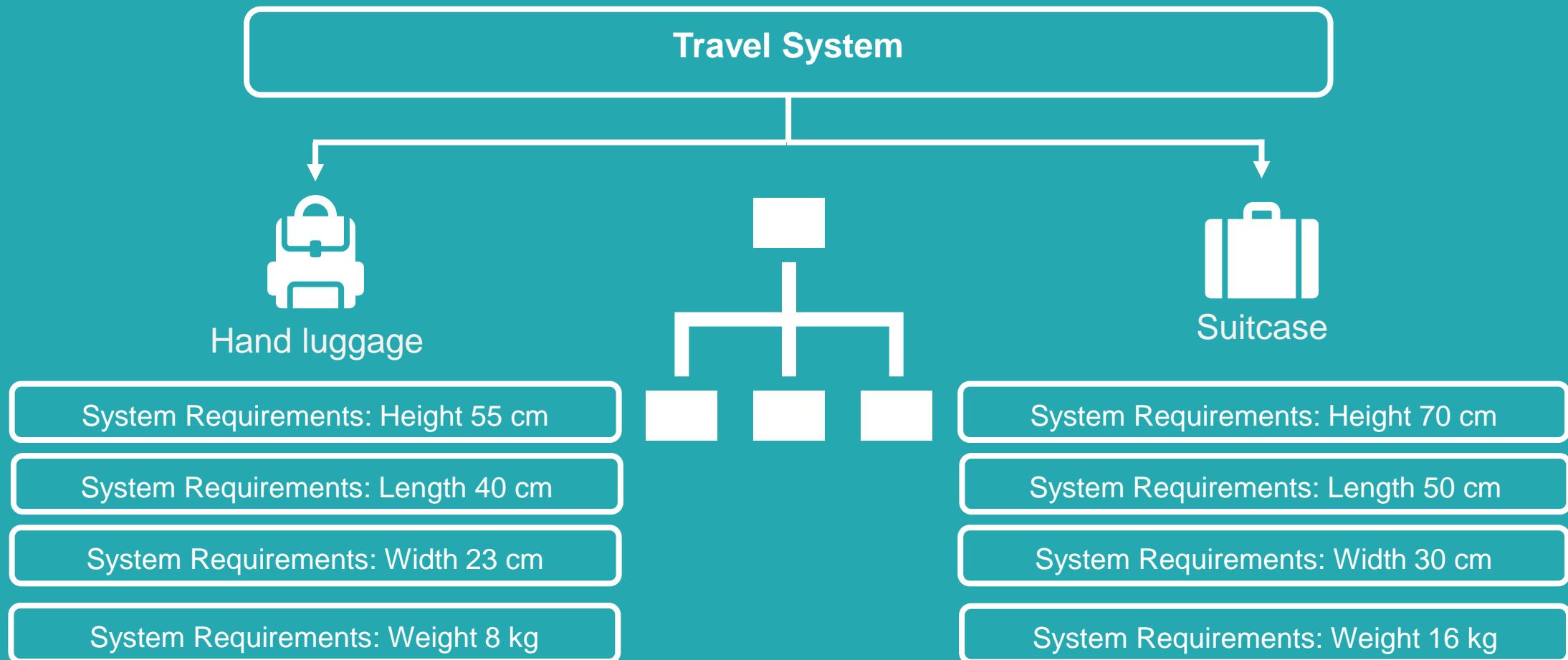
Let's focus on the travel type



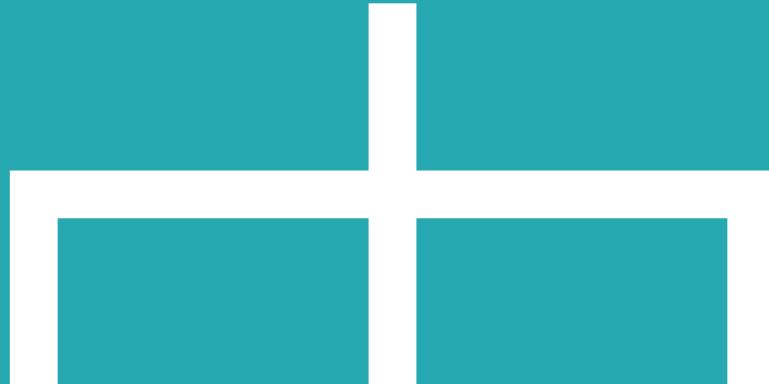
Hand luggage

Suitcase

**The selected travel type has different system requirements for the luggage**



## Based on our travel system we have specific needs – stakeholder requirements



Dividers

Hidden  
laundry bag

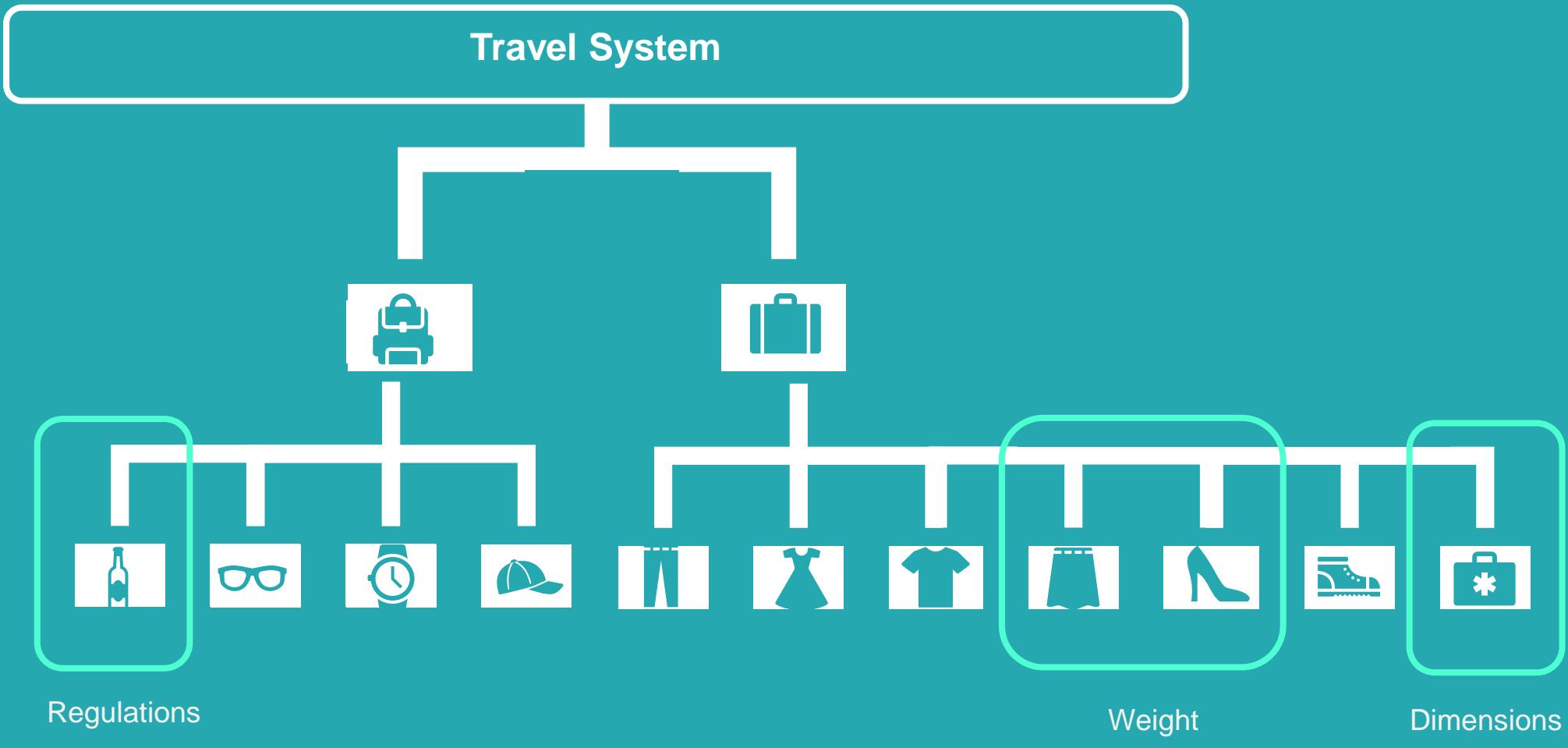
Colour:  
Green



Stakeholder Requirements

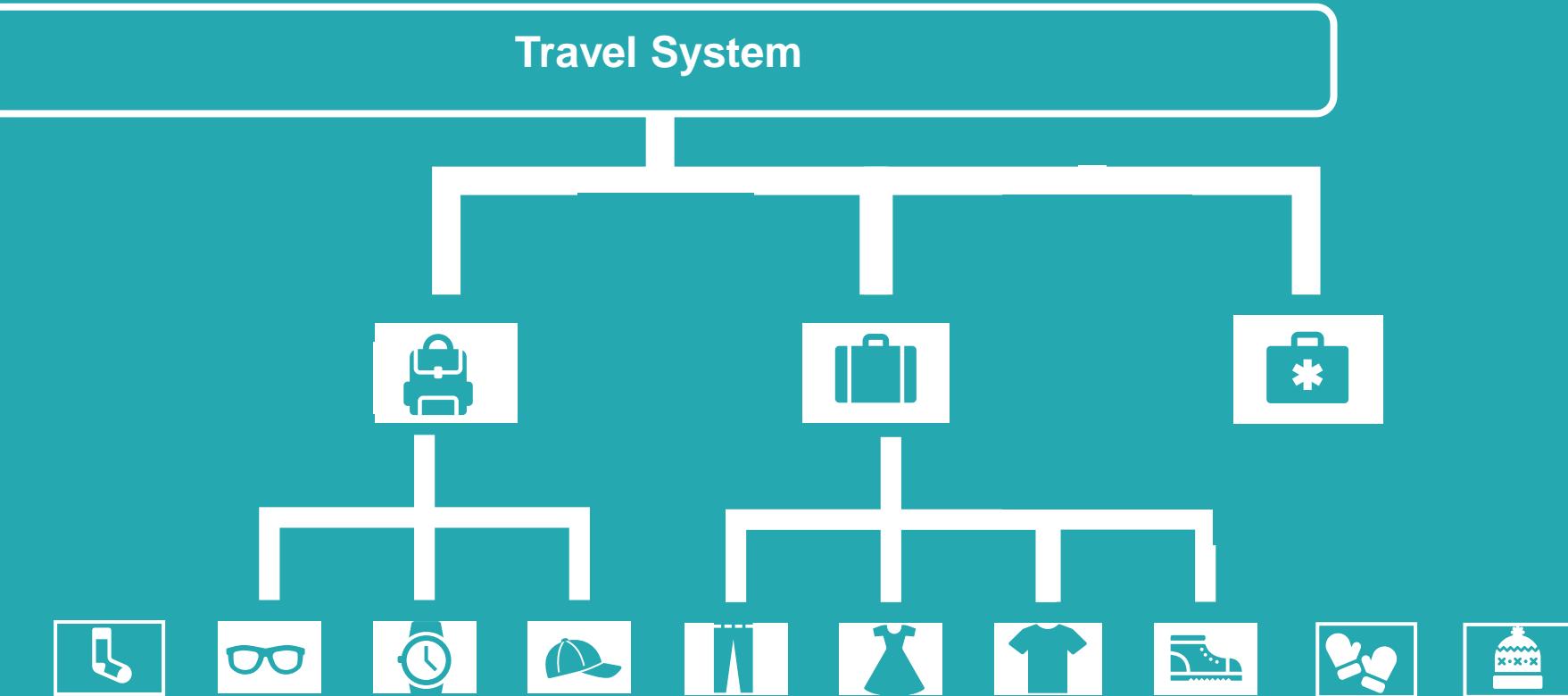
## What's in it for me?

Identifying possible risks, nonconformances, ...



## What's in it for me?

Adapt your stakeholder requirements based on feasible system artefacts & variability

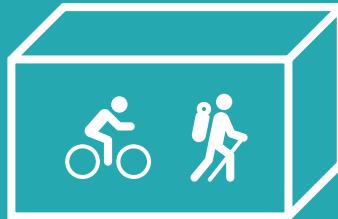


# How to approach step by step this MBSE journey?

Four Phases of System Development based on the RFLP Approach

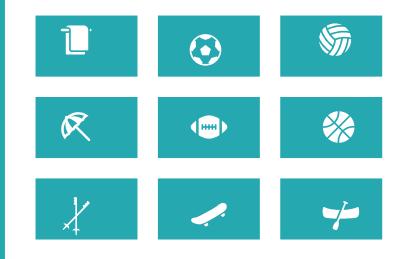
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



Physics

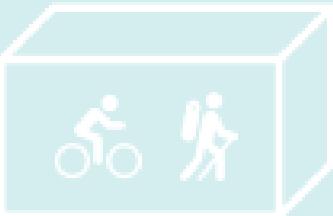
4) Physical Architecture

## How to approach step by step?

Phase 1: What is the black box system about?

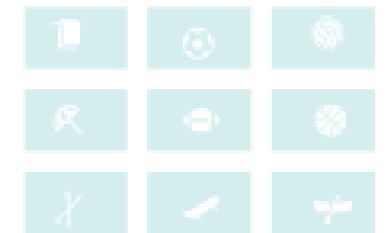
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



Physics

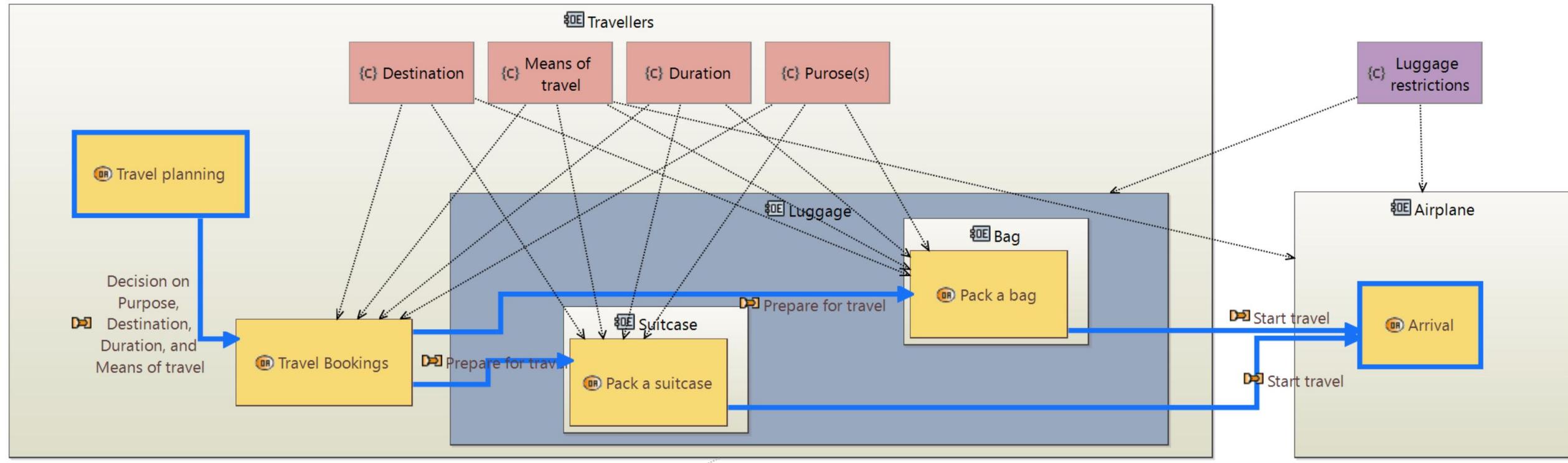
4) Physical Architecture



# Phase 1: Operational Analysis

Black-Box-Perspective to specify system context

Travel preparation



Decision on:

- 1) Destination: Summer holiday with tropical climate
- 2) Duration: Middle trip with two weeks
- 3) Means of Travel: Airplane and optional intermediate travel with car
- 4) Purposes: Relax at the Beach, Snorkeling, Hiking, Sightseeing and Party in the Evening

Destination with warm climate

Light clothing  
{C} and sun protection

# Phase 1: Operational Analysis

## Structuring and preparing the Requirements

The screenshot shows a user interface for a Model-Based System Engineering (MBSE) project titled "My suitcase". The left sidebar contains a navigation menu with items such as Home, System Requirements, Stakeholder Requirements, Restrictions, Documents & Pages, and Work Items. A search bar and a user profile for Susan Faust are also present. The main content area features a welcome message "Welcome to the MBSE - My suitcase Project" and a photograph of a vintage camera resting on top of a brown leather suitcase.

## How to approach step by step?

Phase 1: What is the black box system about?

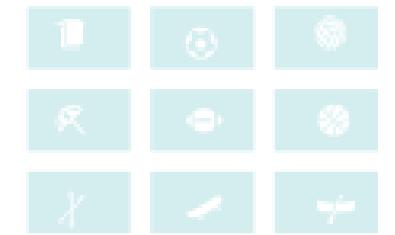
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



Physics

4) Physical Architecture

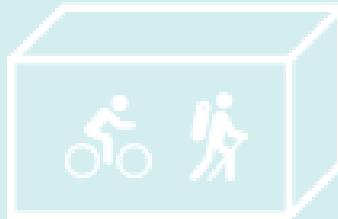


# How to approach step by step this MBSE journey?

Phase 2: From Black Box to White Box

Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



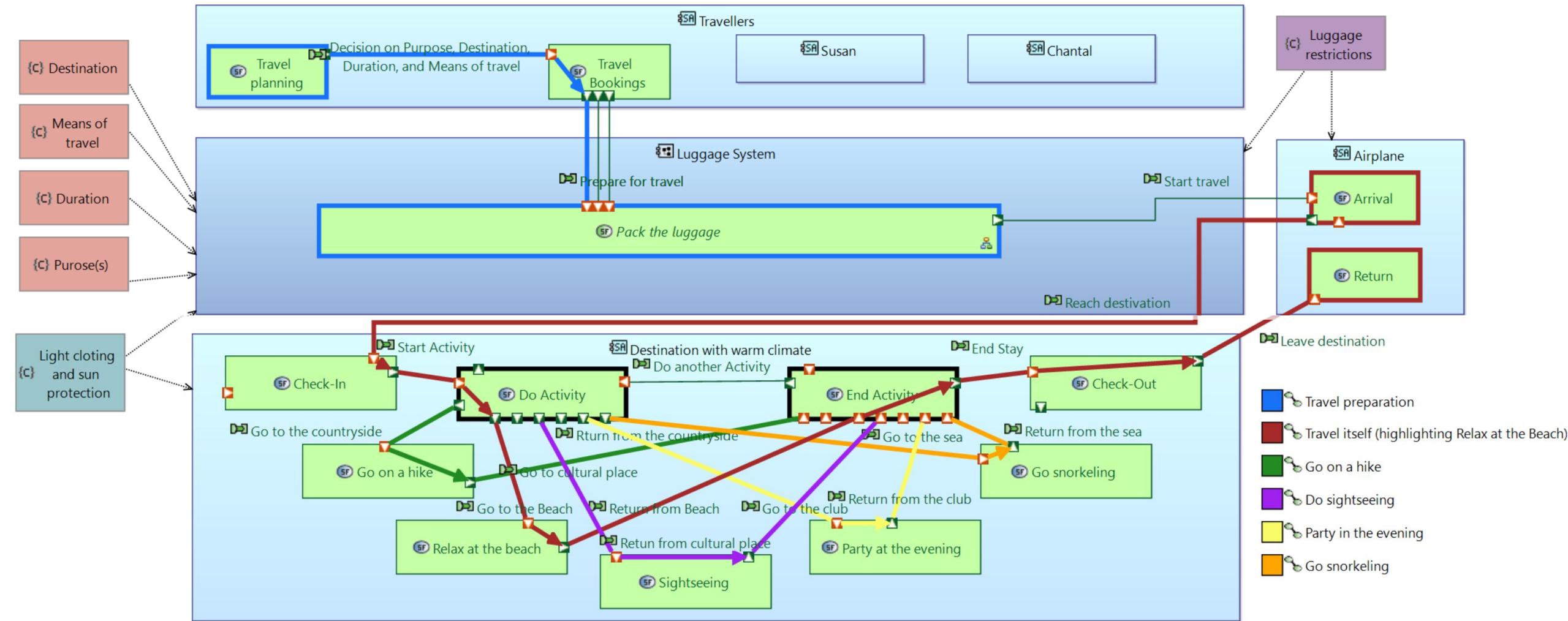
Physics

4) Physical Architecture



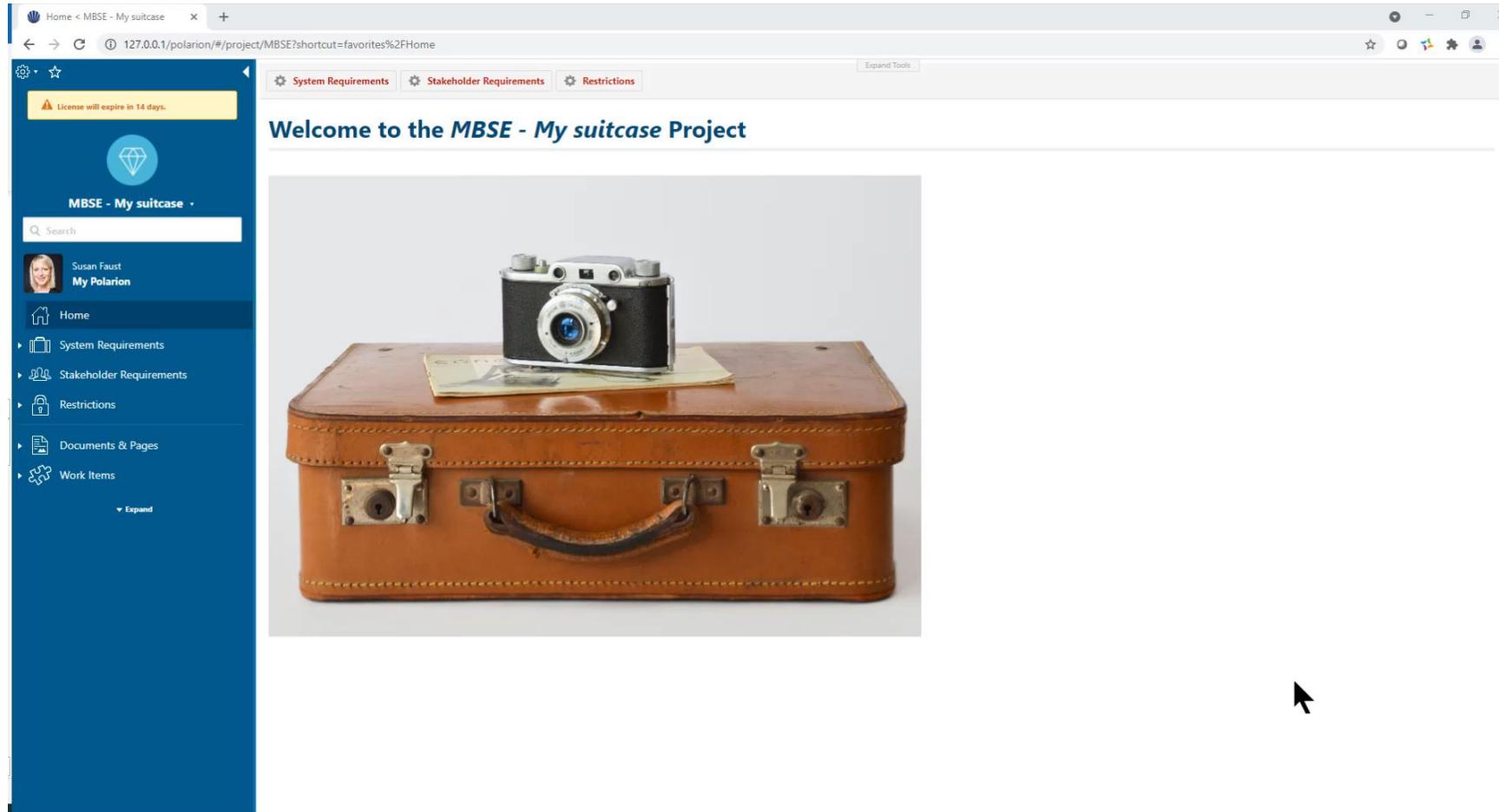
## Phase 2: System Analysis

White-Box-perspective with exact knowledge of system boundary to specify context functions



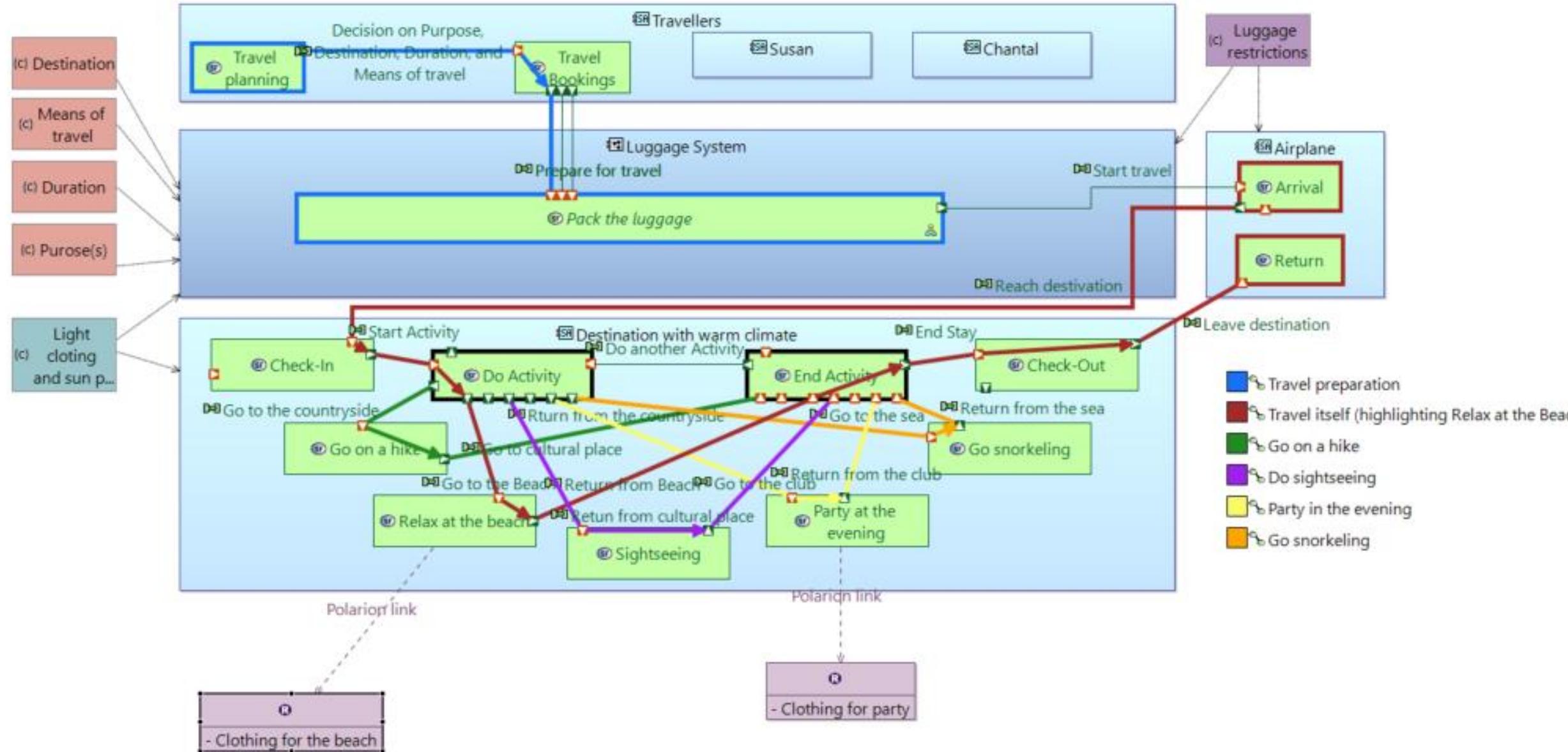
## Phase 2: System Analysis

White-Box-perspective with exact knowledge of system boundary and mapped requirements



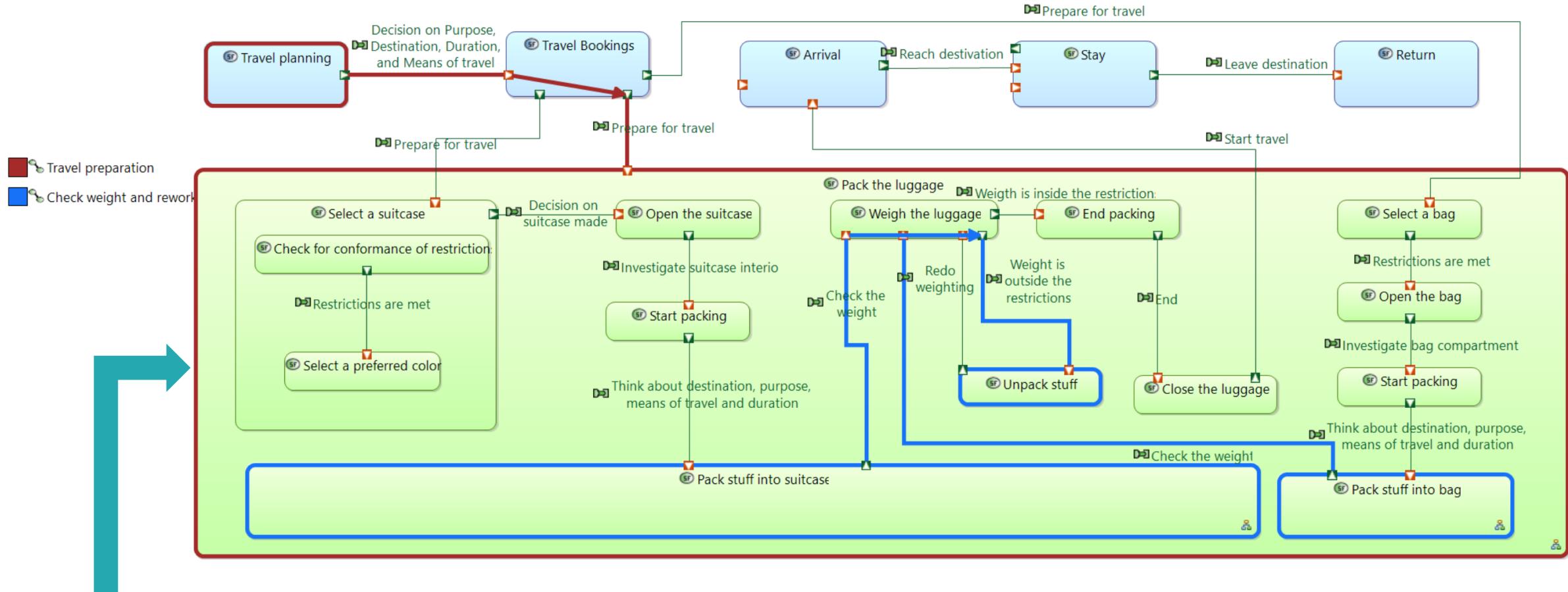
## Phase 2: System Analysis

White-Box-perspective with exact knowledge of system boundary and mapped requirements



## Phase 2: System Analysis

White-Box-perspective of system to specify system functions: general system behavior



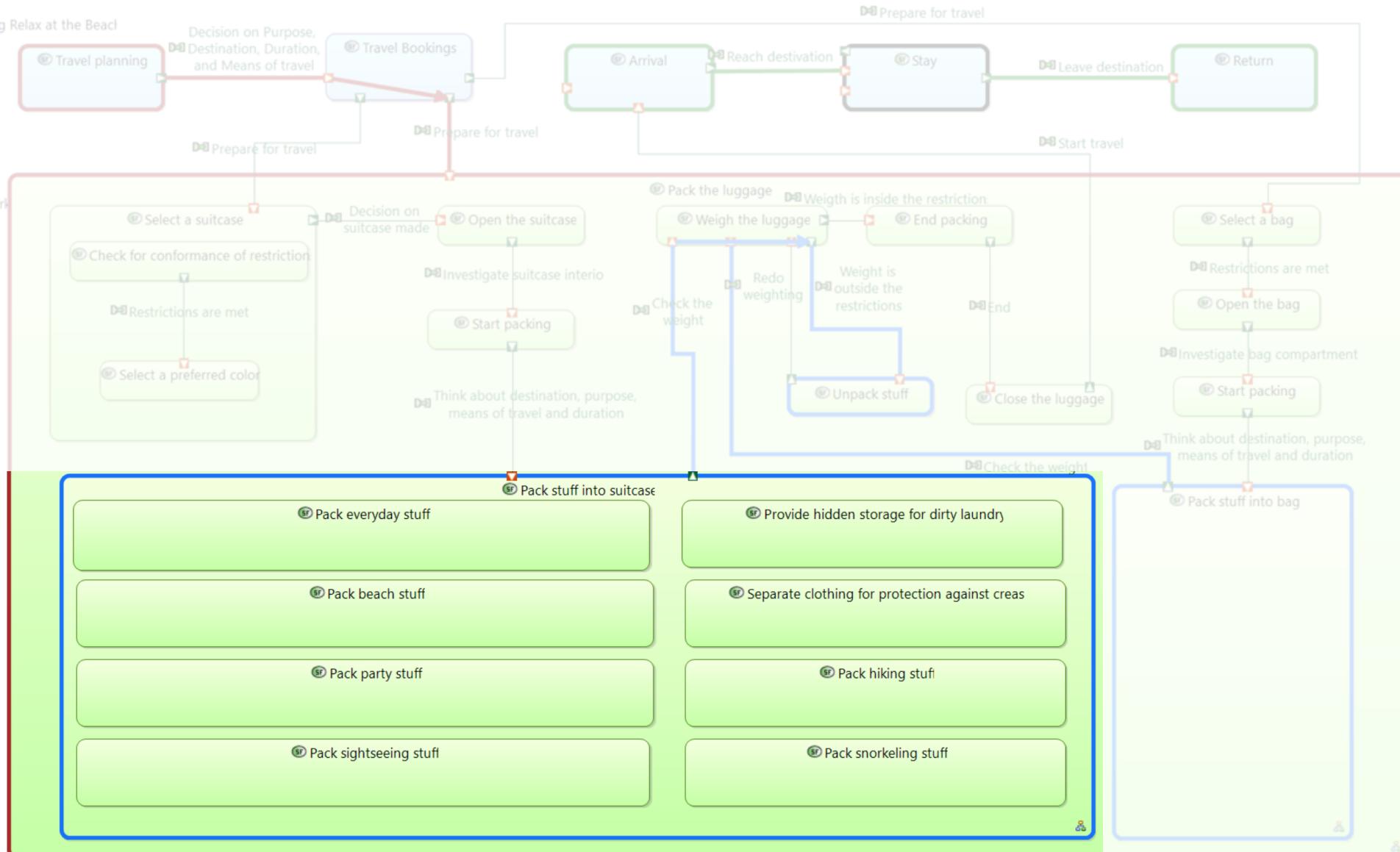
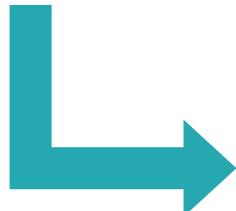
Same steps in  
travel preparation  
for every travel

## Phase 2: System Analysis

White-Box-perspective of system to specify system functions: context-related system behavior

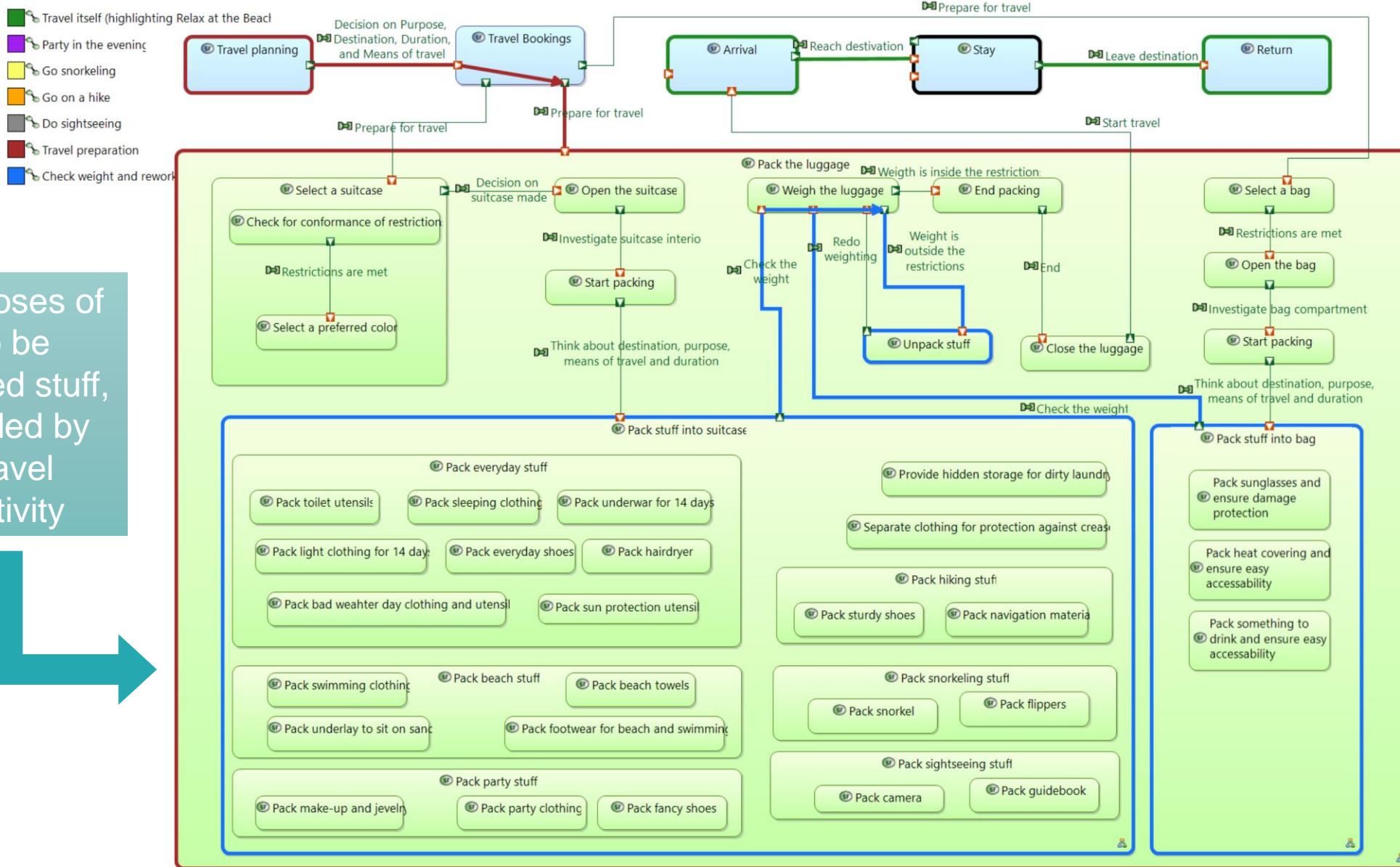
- Travel itself (highlighting Relax at the Beach)
- Party in the evening
- Go snorkeling
- Go on a hike
- Do sightseeing
- Travel preparation
- Check weight and rework

One function  
for each of  
our travel  
activities and  
for everyday  
stuff



## Phase 2: System Analysis

White-Box-perspective of system to specify system functions: detailed system behavior



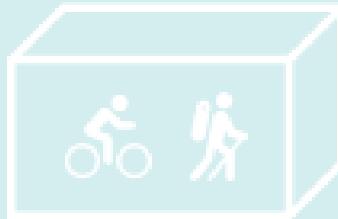
Purposes of  
to be  
packed stuff,  
divided by  
travel  
activity

# How to approach step by step this MBSE journey?

## Phase 2: From Black Box to White Box

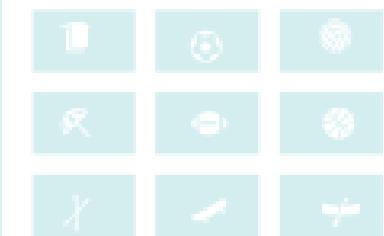
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



Physics

4) Physical Architecture



# How to approach step by step this MBSE journey?

## Phase 3: Map System Purpose with System Items

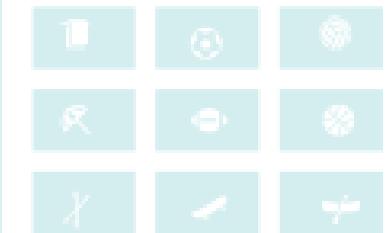
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



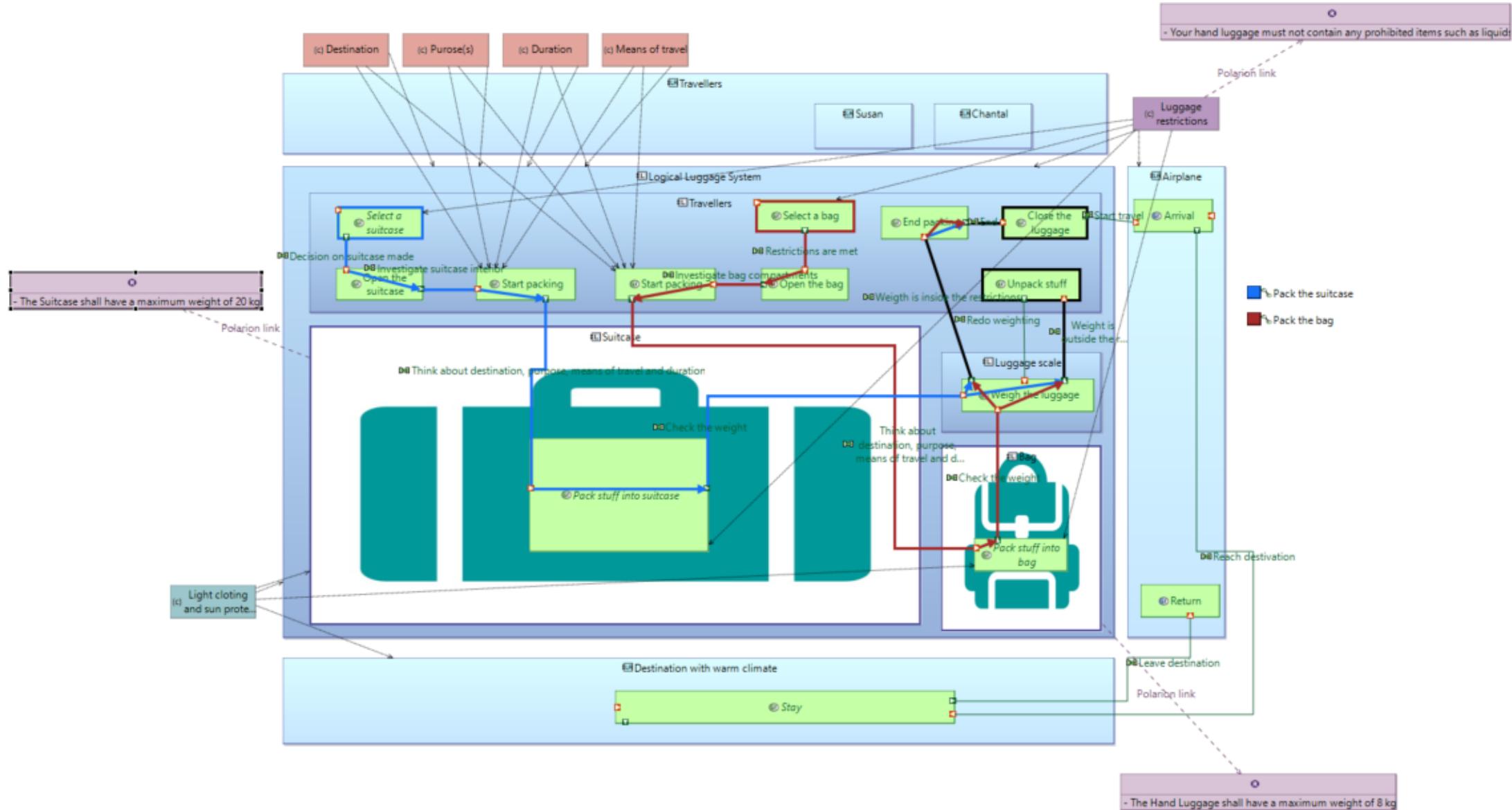
Physics

4) Physical Architecture



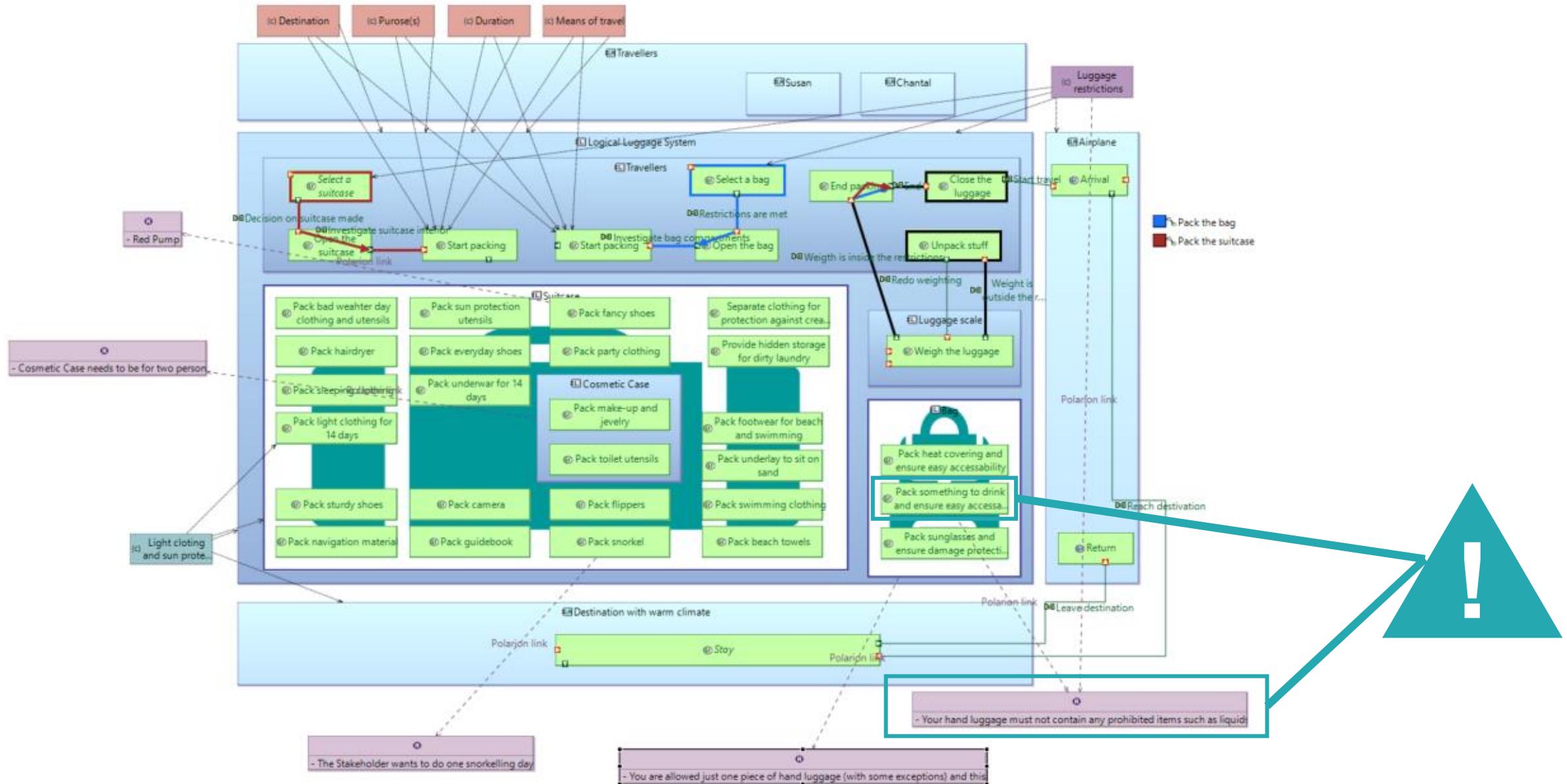
## Phase 3: Logical Architecture

Function-based structure decomposition to map general functions to logical solution components



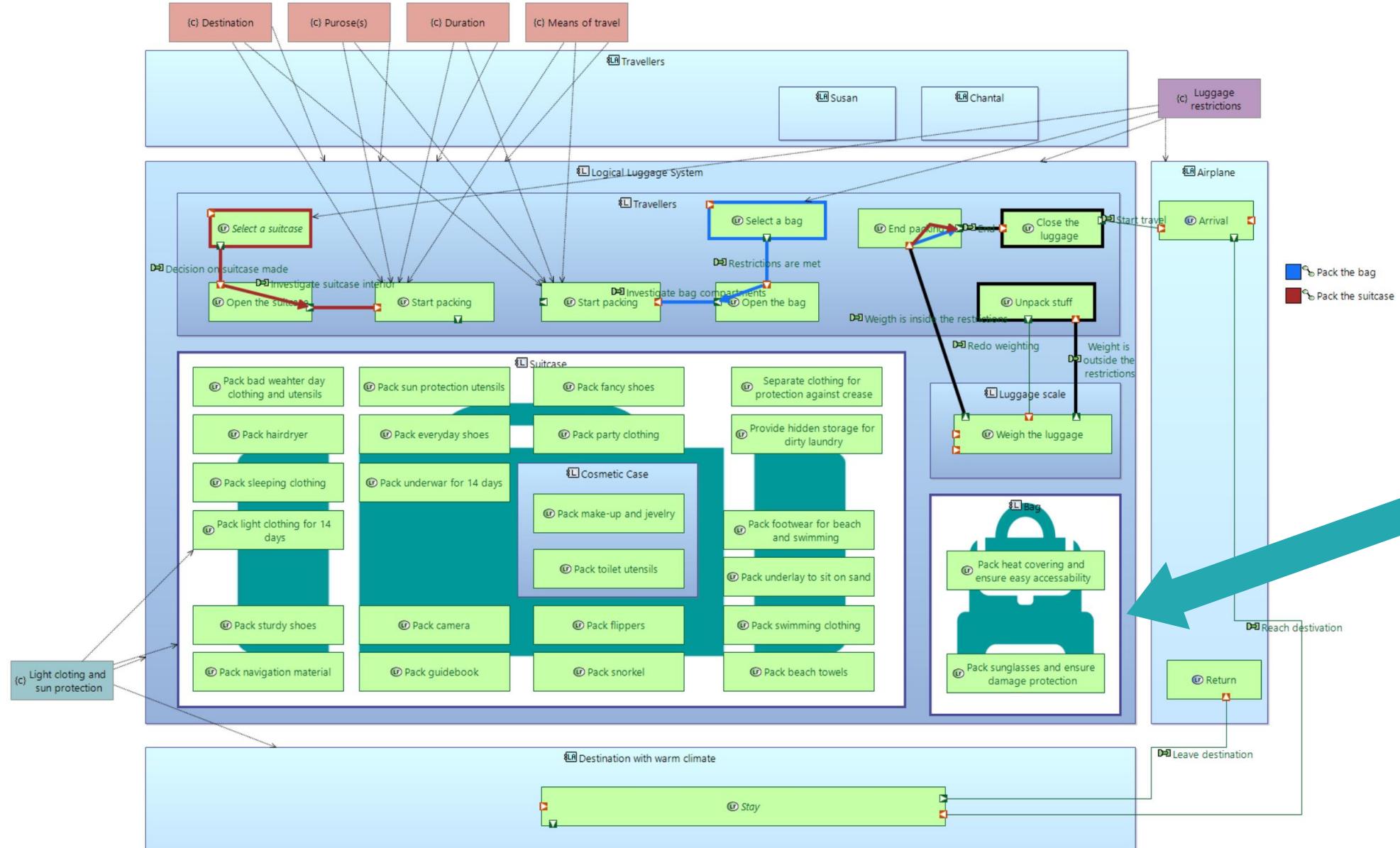
## Phase 3: Logical Architecture

Function-based structure decomposition to map detailed functions to logical solution components



## Phase 3: Logical Architecture

Function-based structure decomposition without obvious violation of luggage restrictions



# How to approach step by step this MBSE journey?

## Phase 3: Map System Purpose with System Items

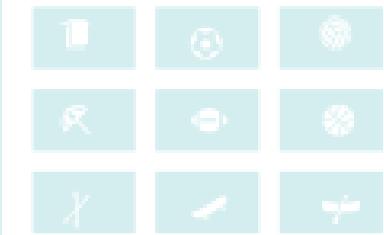
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



Physics

4) Physical Architecture



# How to approach step by step this MBSE journey?

Phase 4: What is the physic of your suitcase?

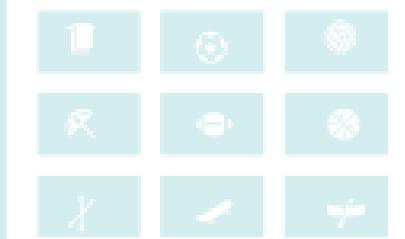
Requirements

1) Operational Analysis



Functions

2) System Analysis



Logic

3) Logical Architecture



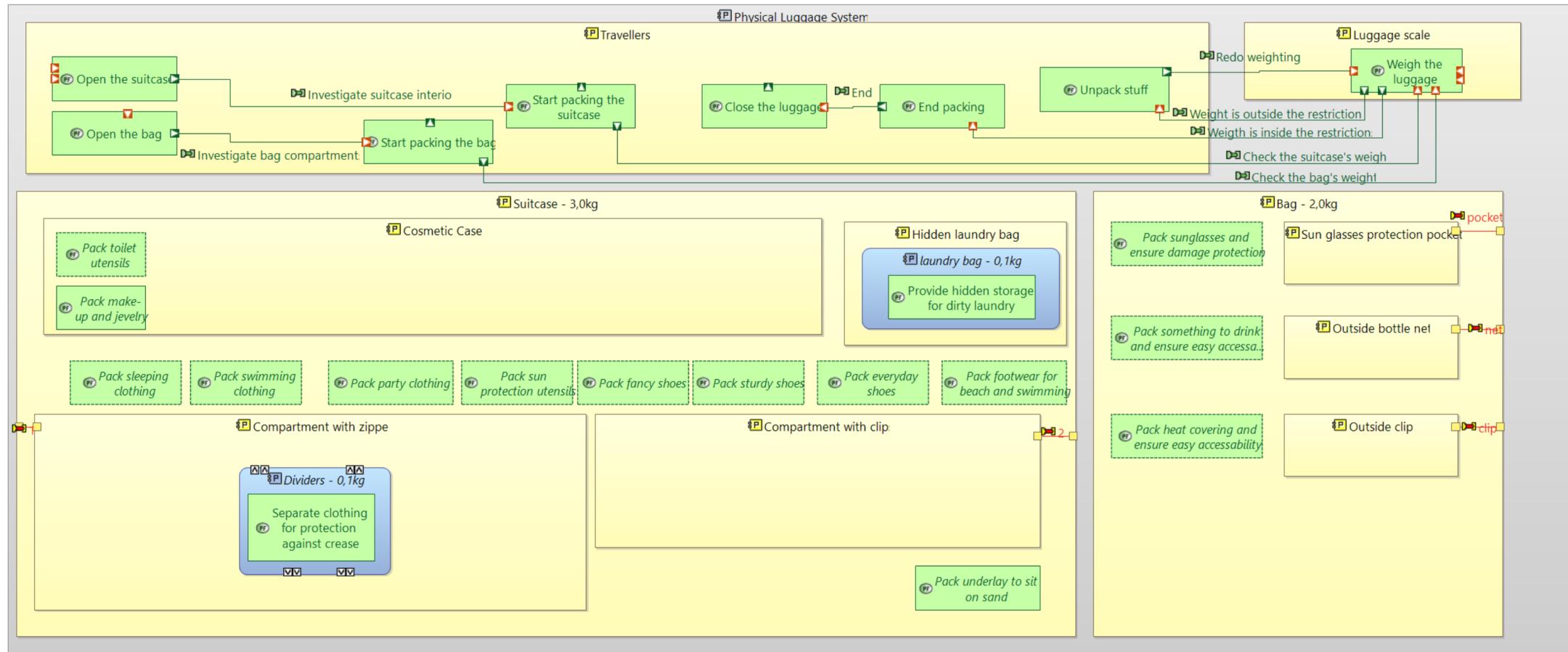
Physics

4) Physical Architecture



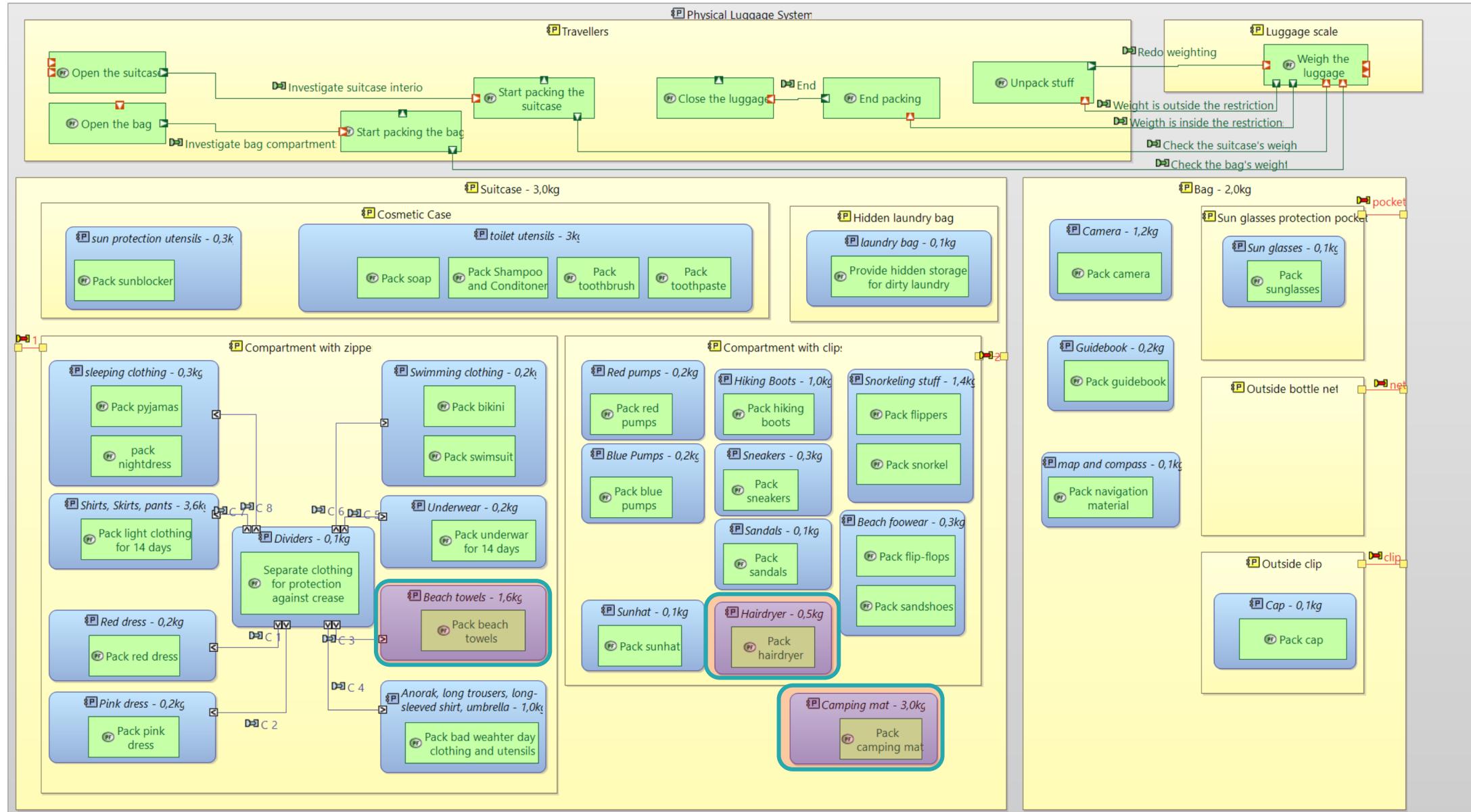
## Phase 4: Physical Architecture

Physics-based structure decomposition to specify general physical components and function fulfillment



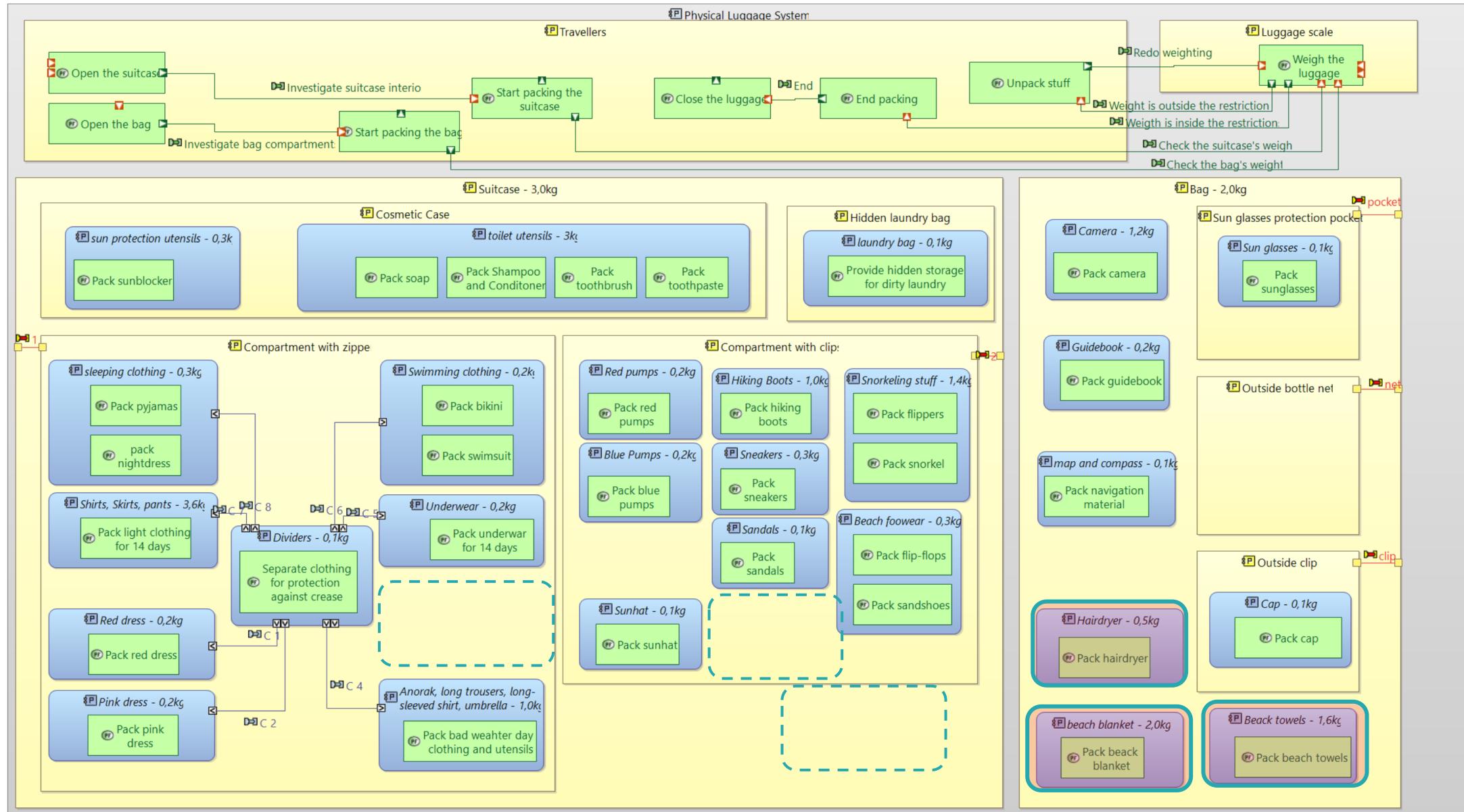
## Phase 4: Physical Architecture

Physics-based structure decomposition to specify detailed physical components and function fulfillment



## Phase 4: Physical Architecture

## Physics-based structure decomposition without violation of weight restrictions

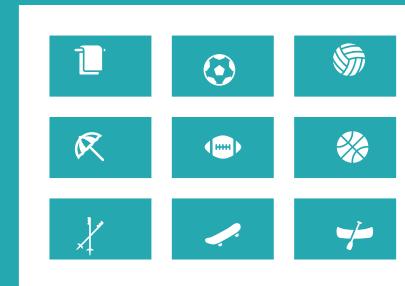


# Four Phases of System Development

1) Operational Analysis



2) System Analysis



3) Logical Architecture



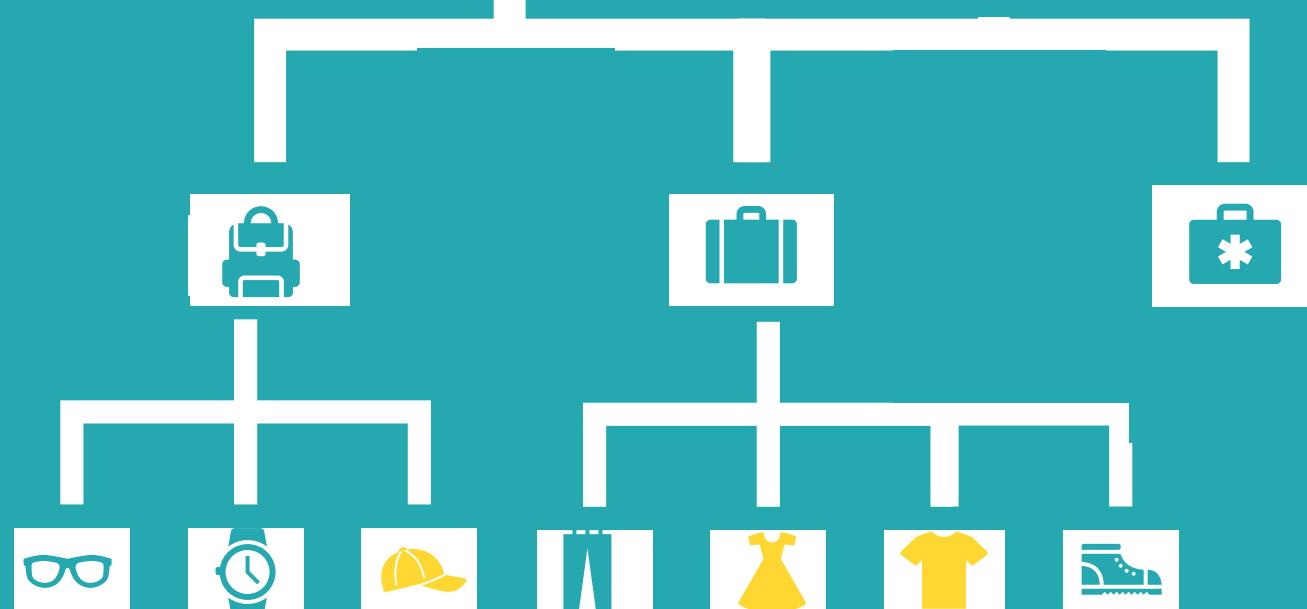
4) Physical Architecture



## Outlook: What's in it for me?

Adapt your system approaches for different holidays

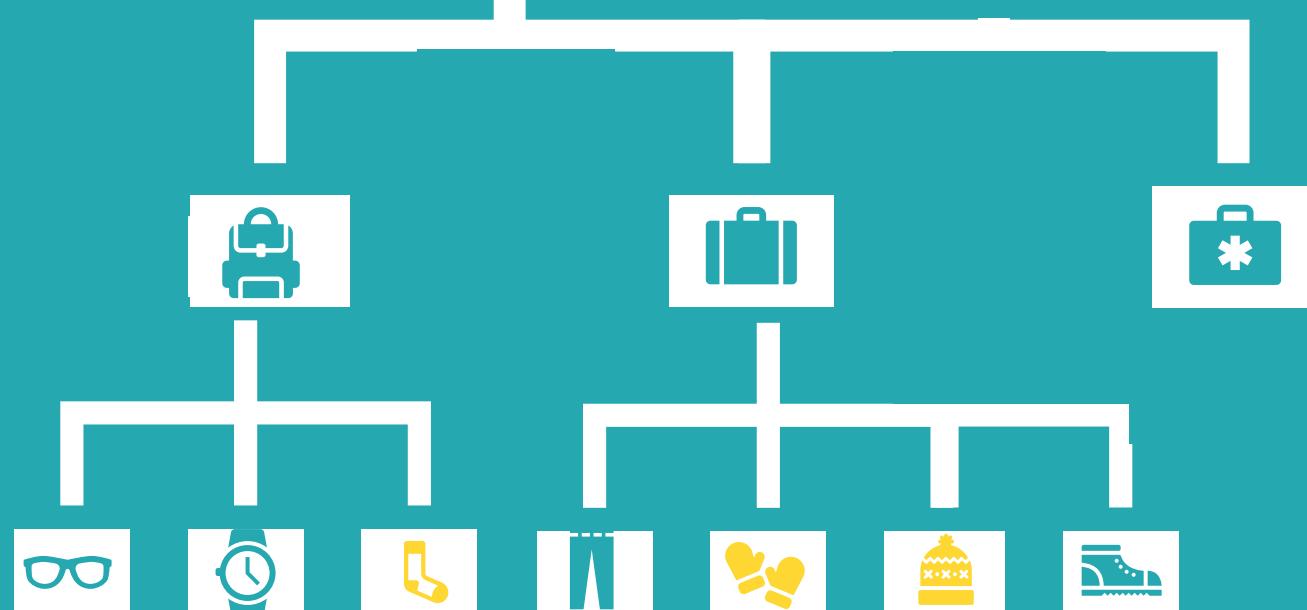
### Travel System for summer holidays



## Outlook: What's in it for me?

Adapt your system approaches for different holidays

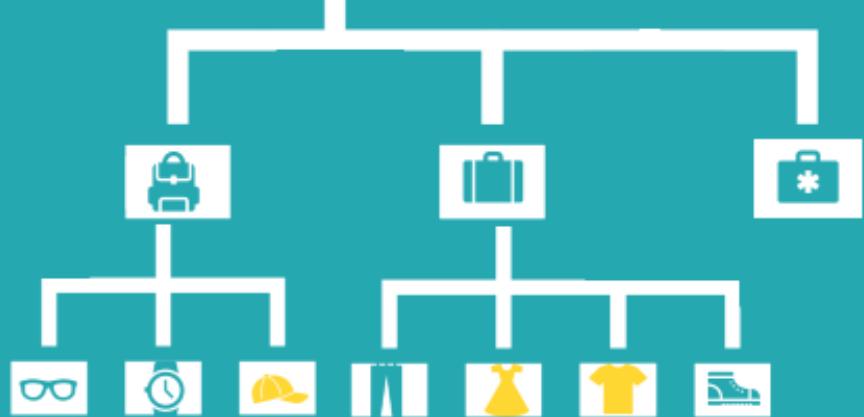
### Travel System for winter holidays



## Outlook

Reuse your specific system approaches for upcoming holidays

Travel System for summer holidays



Travel System for winter holidays





**Disclaimer: All models have been created by Siemens**



**Susan Faust**

PreSales Solution Consultant Polarion

[susan.faust@siemens.com](mailto:susan.faust@siemens.com)

+49 (0) 174 2038 991



**Dr. Chantal Sinnwell**

Solution Architect (MBSE & MBPE)

[chantal.sinnwell@siemens.com](mailto:chantal.sinnwell@siemens.com)

+49 (0) 172 6927 550

