

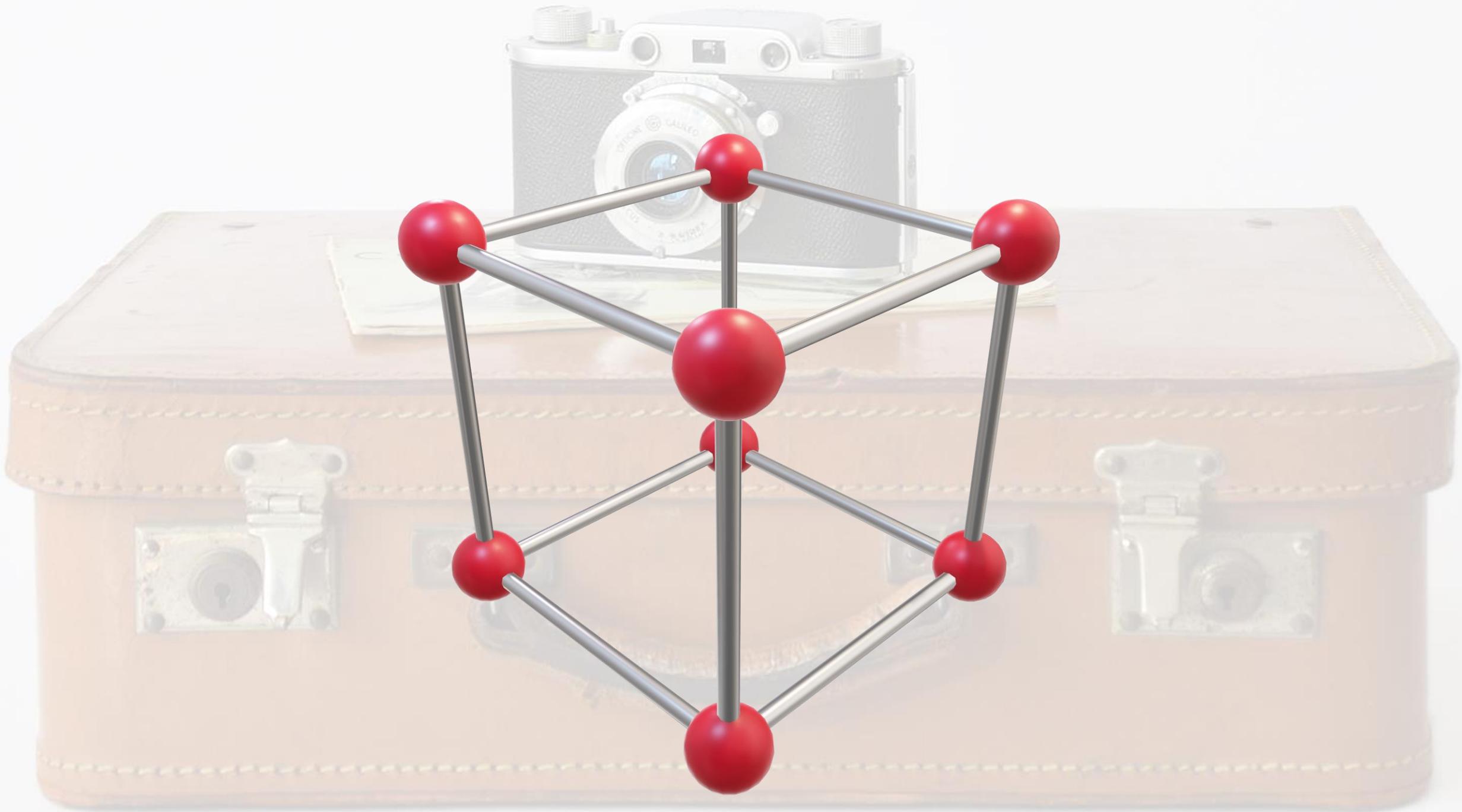




I pack my suitcase and take with me...







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



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**Dr. Chantal Sinnwell**

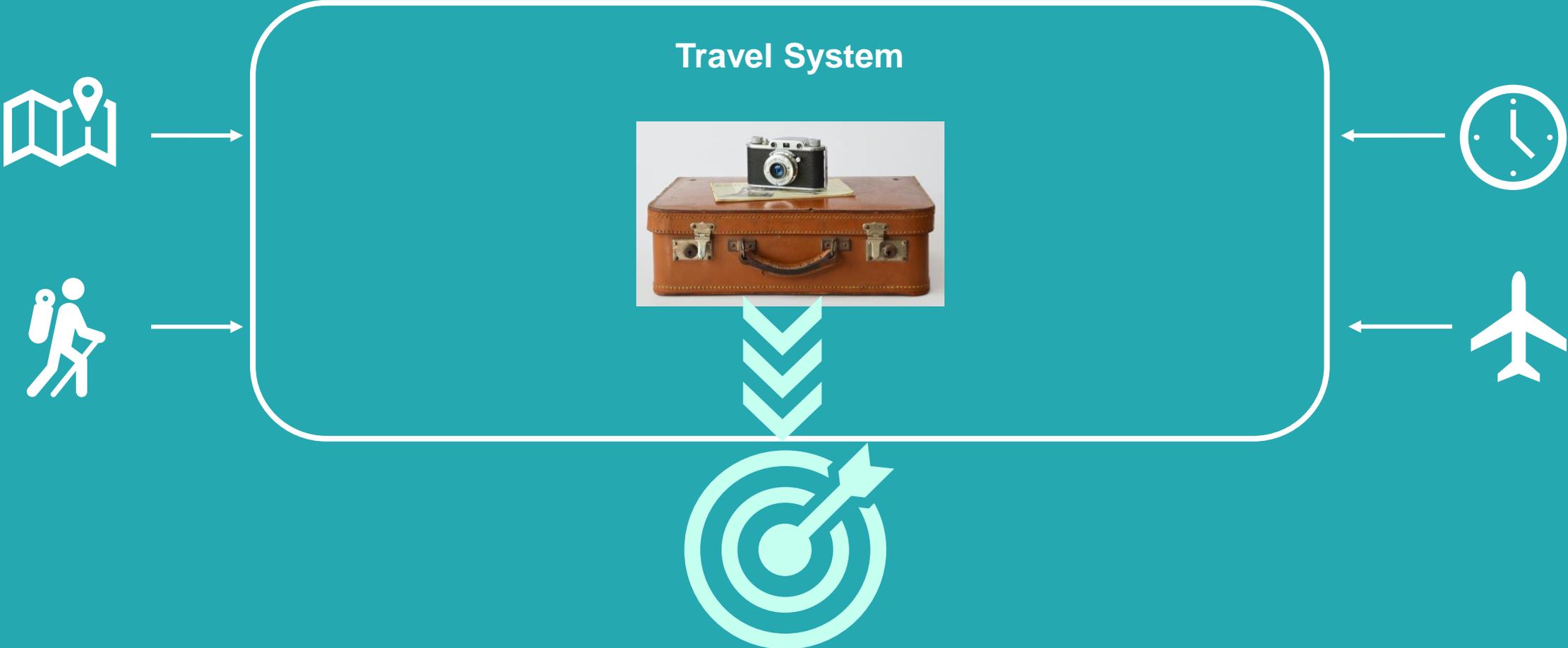
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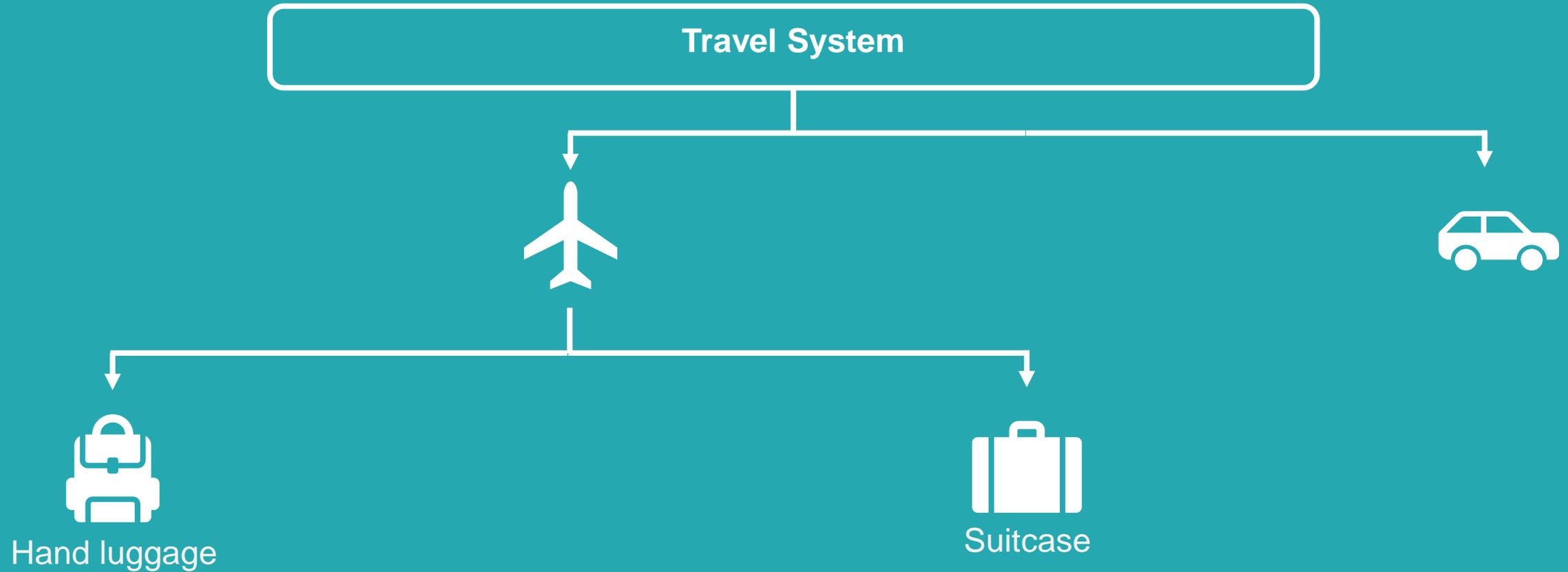
# Let's imagine we see our suitcase also as a system...

Travel System as a Black Box influenced by different external factors

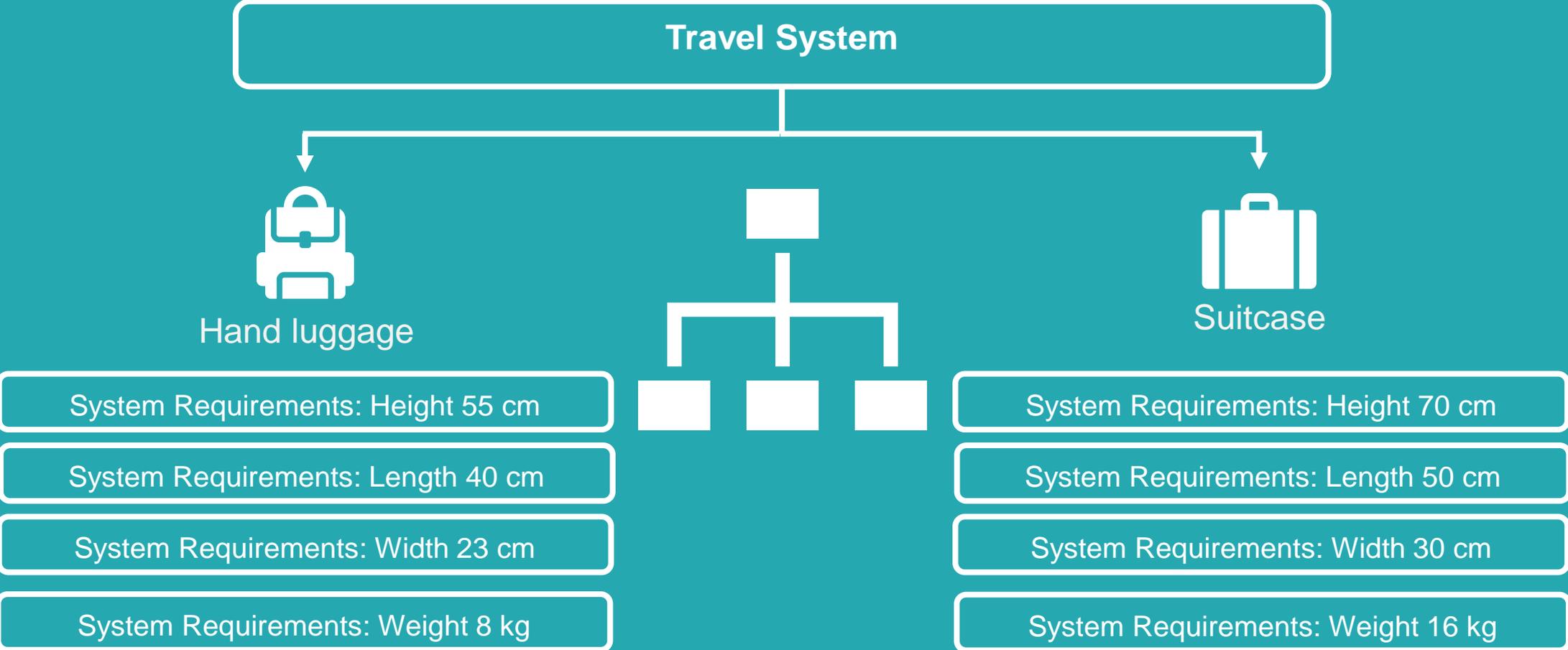


# Travel System as a White Box with different sub systems

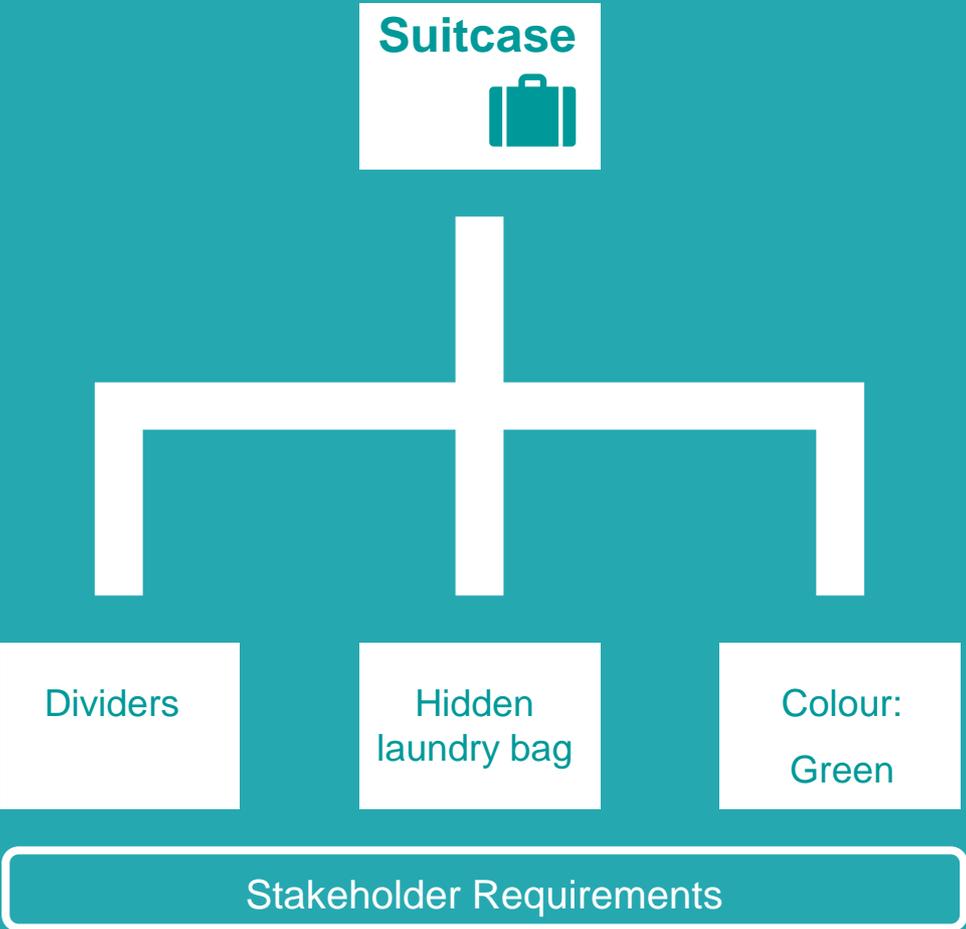
Let's focus on the travel type



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

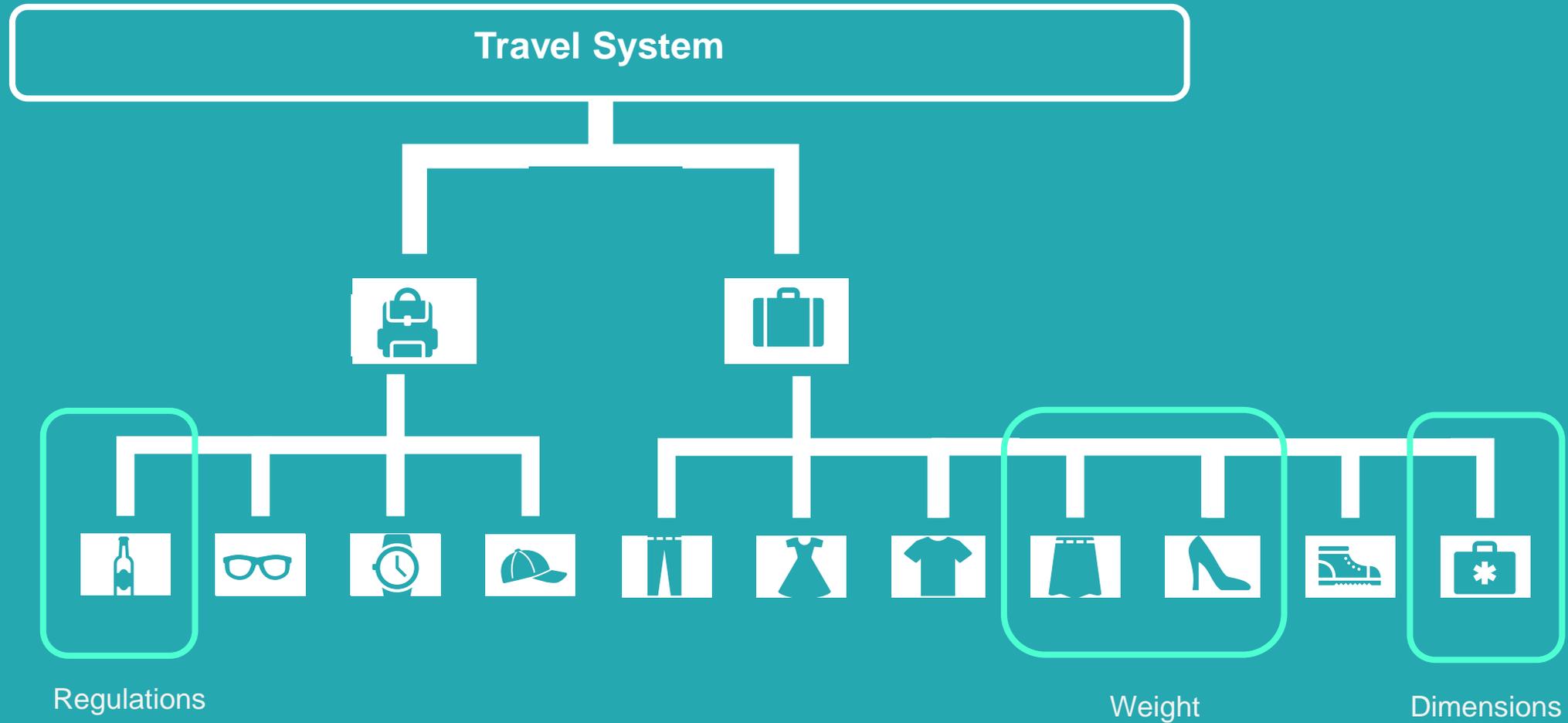


# Based on our travel system we have specific needs – stakeholder requirements



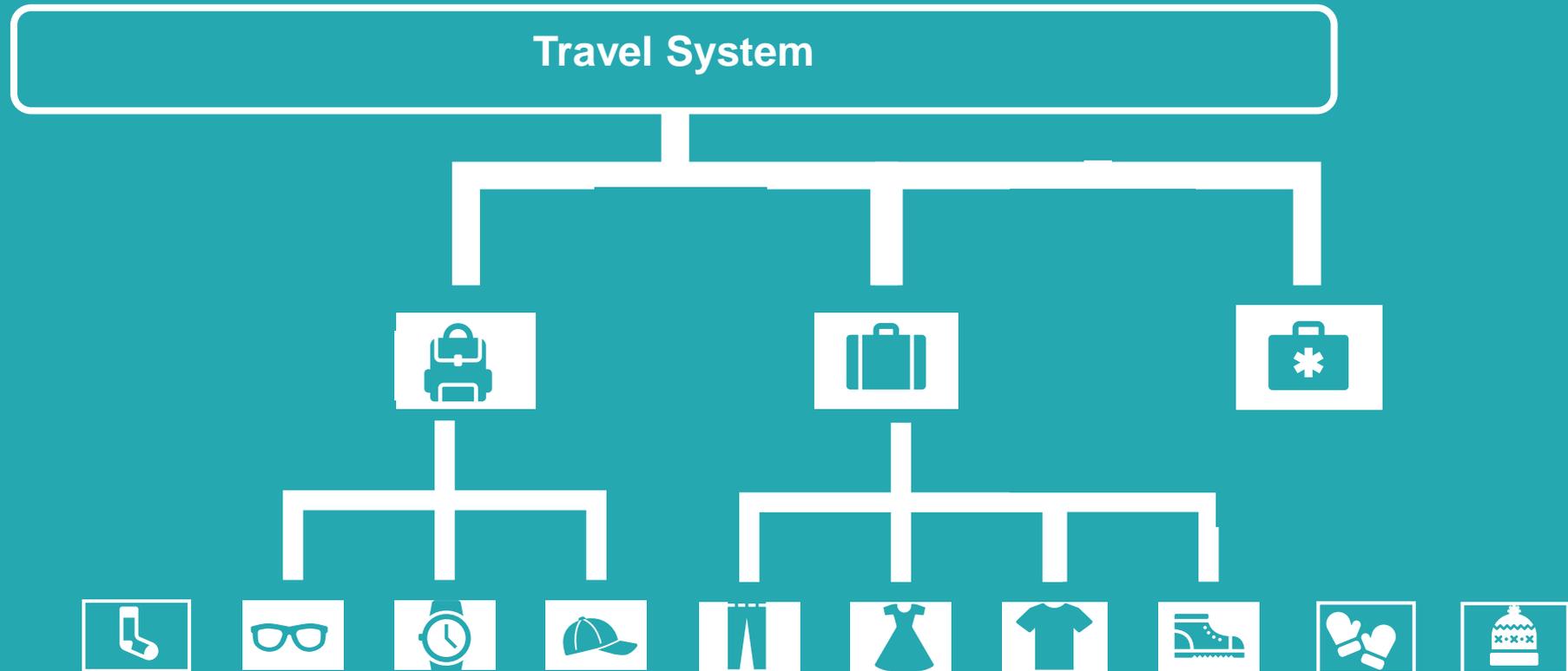
# What's in it for me?

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

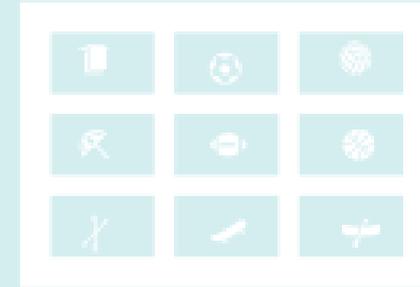
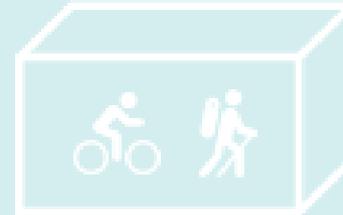


# How to approach step by step?

Phase 1: What is the black box system about?

Requirements

1) Operational Analysis



Functions

2) System Analysis

Logic

3) Logical Architecture



Physics

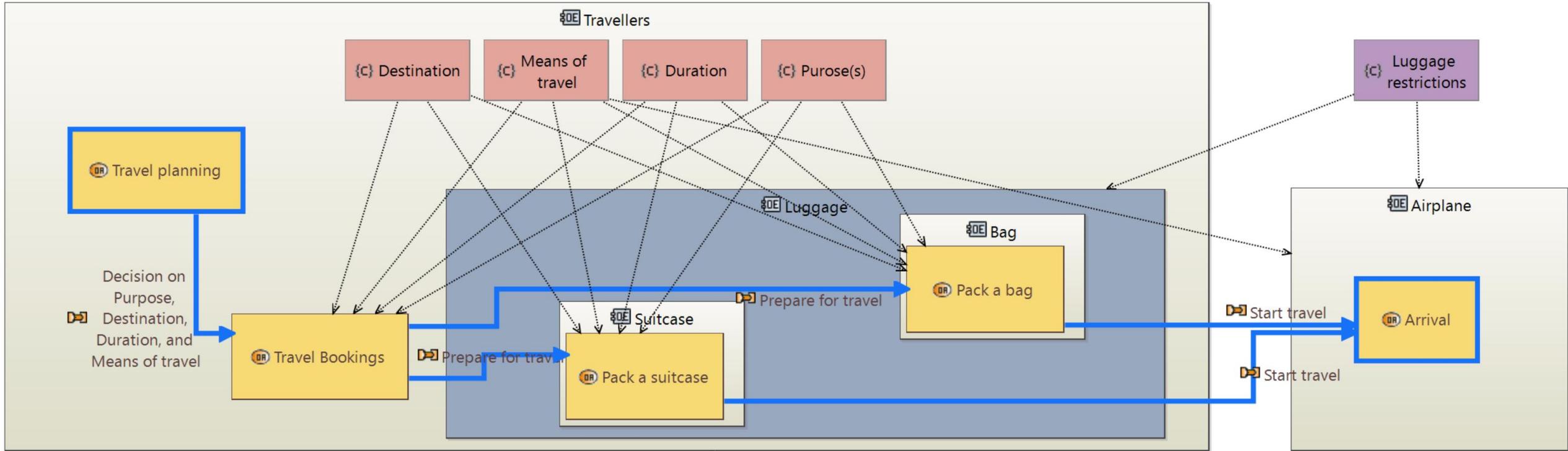
4) Physical Architecture



# Phase 1: Operational Analysis

## Black-Box-Perspective to specify system context

Travel preparation



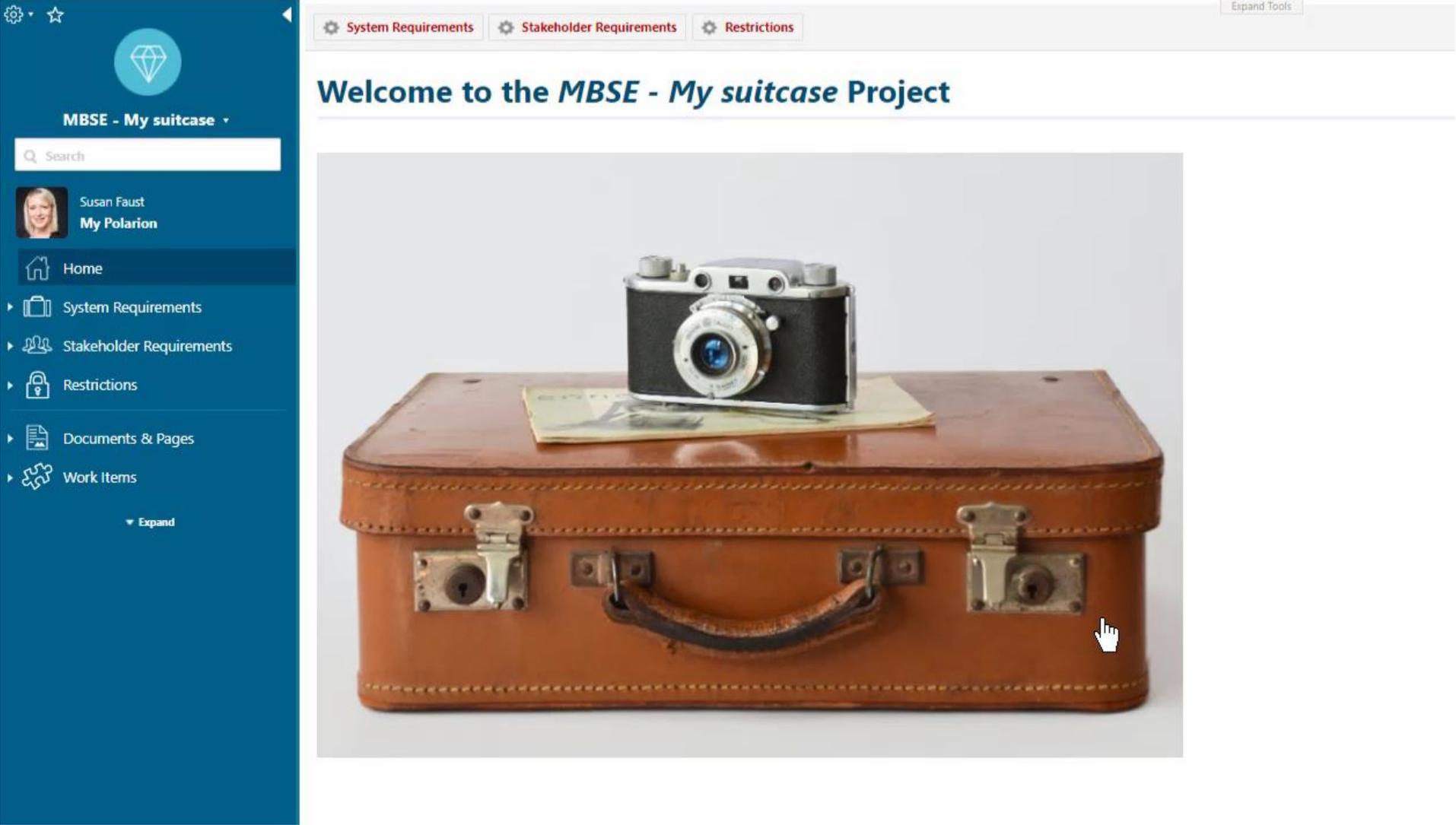
- Decision on:
- 1) Destination: Summer holiday with tropical climate
  - 2) Duration: Middle trip with two weeks
  - 3) Means of Travel: Airplane and optional intermediate travel with car
  - 4) Purposes: Relax at the Beach, Snorkeling, Hiking, Sightseeing and Party in the Evening

Destination with warm climate

Light cloting  
{c} and sun protection

# Phase 1: Operational Analysis

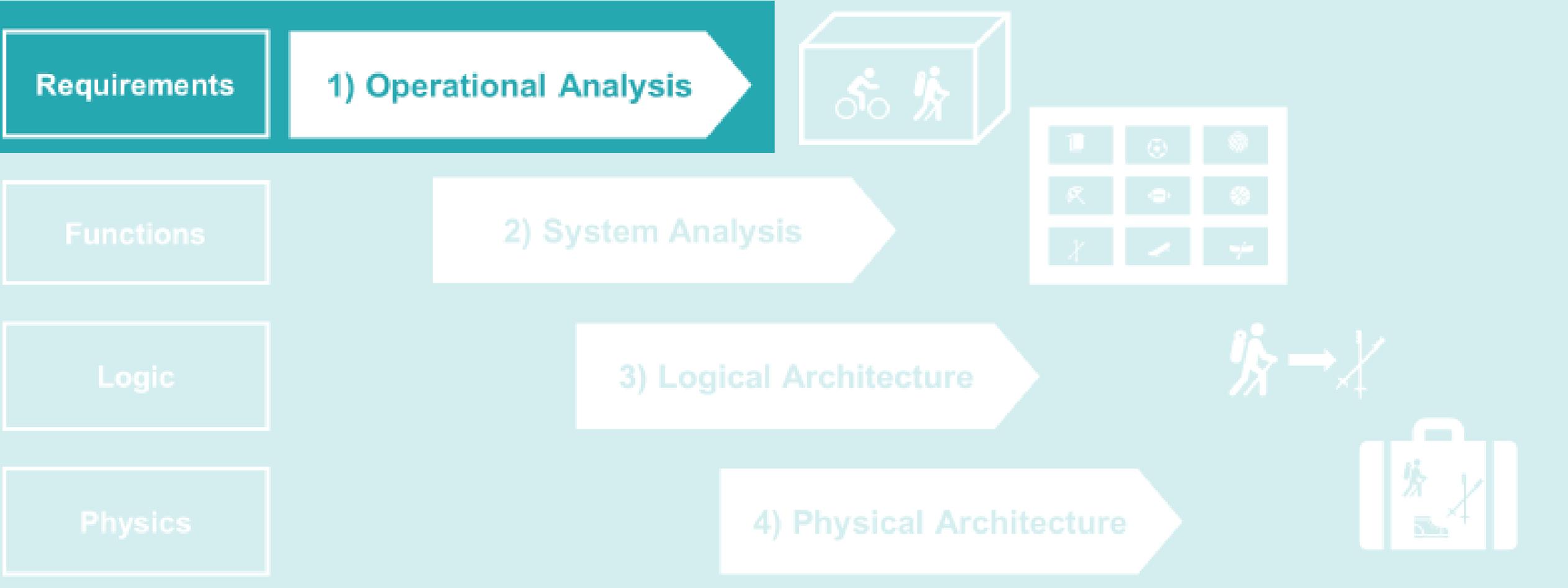
## Structuring and preparing the Requirements



The screenshot shows a software interface for a project named "MBSE - My suitcase Project". On the left is a dark blue sidebar with a search bar, a user profile for "Susan Faust My Polarion", and a navigation menu with items: Home, System Requirements, Stakeholder Requirements, Restrictions, Documents & Pages, and Work Items. The main content area has a header with three tabs: "System Requirements", "Stakeholder Requirements", and "Restrictions", and an "Expand Tools" button. Below the header is a large image of a brown leather suitcase with a vintage camera and a yellow envelope on top. A mouse cursor is visible over the bottom right corner of the suitcase image.

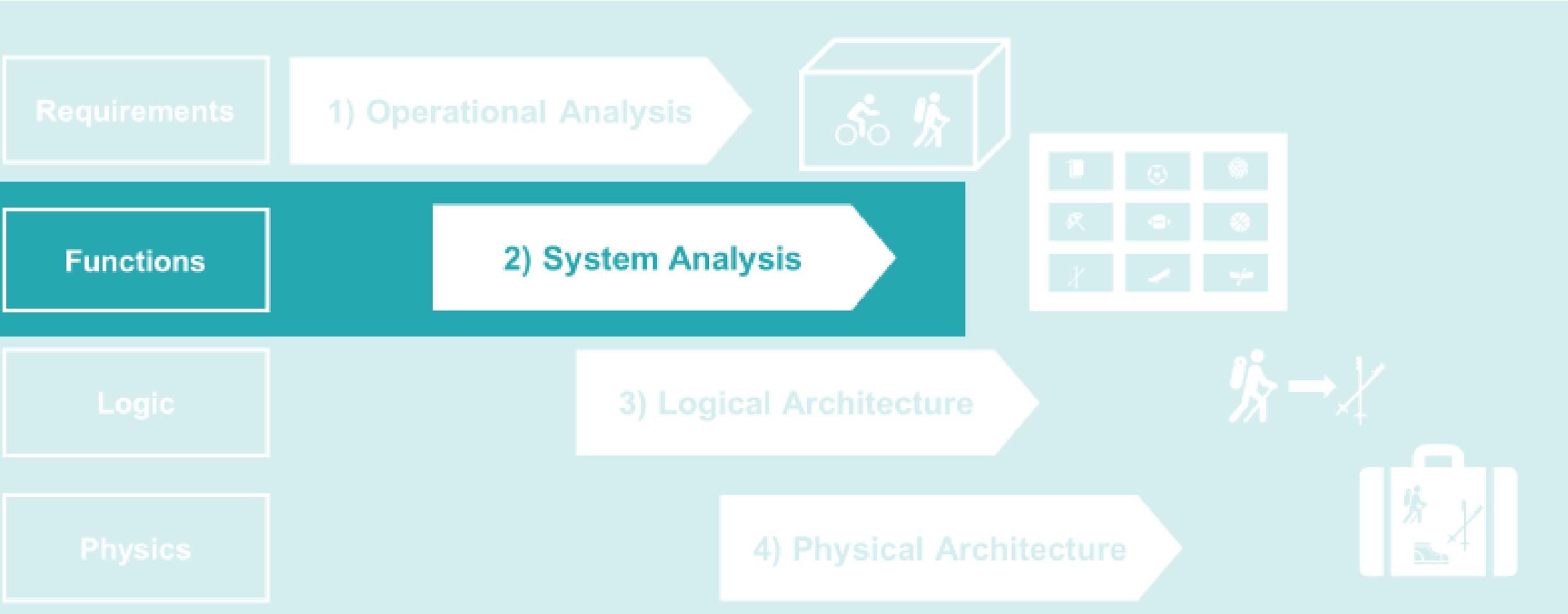
# How to approach step by step?

Phase 1: What is the black box system about?



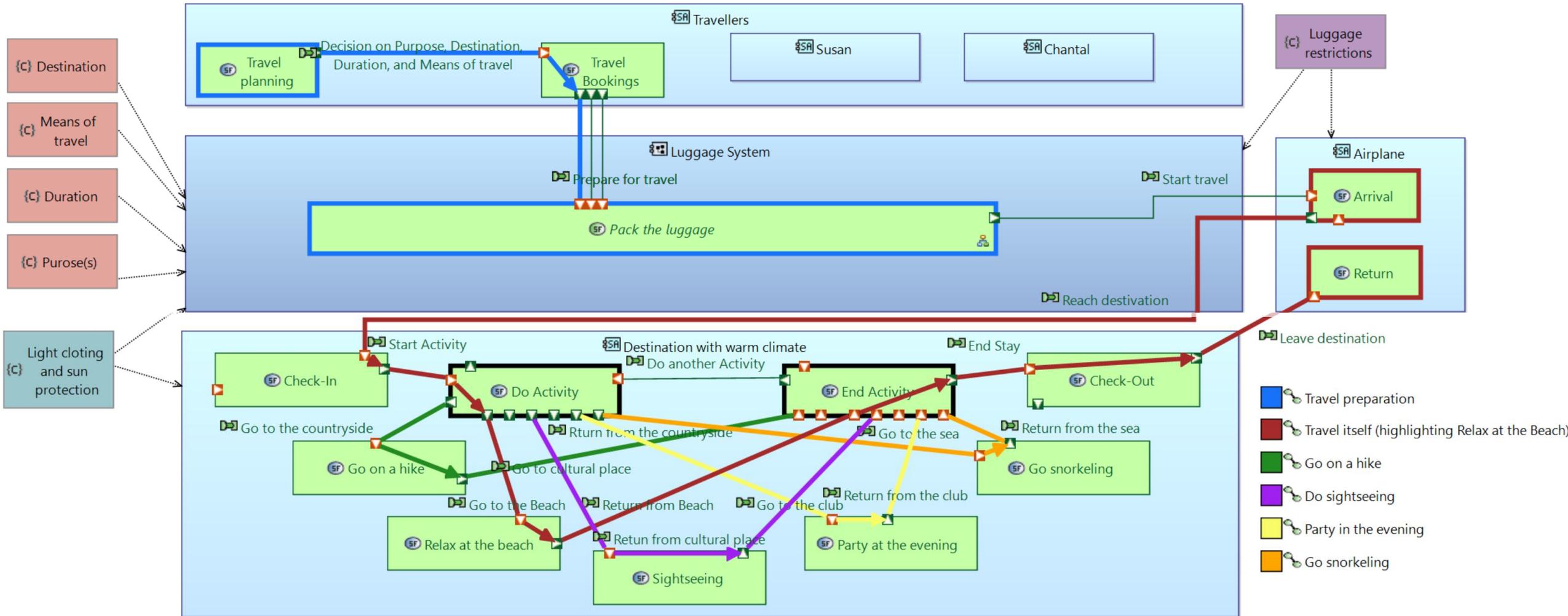
# How to approach step by step this MBSE journey?

## Phase 2: From Black Box to White Box



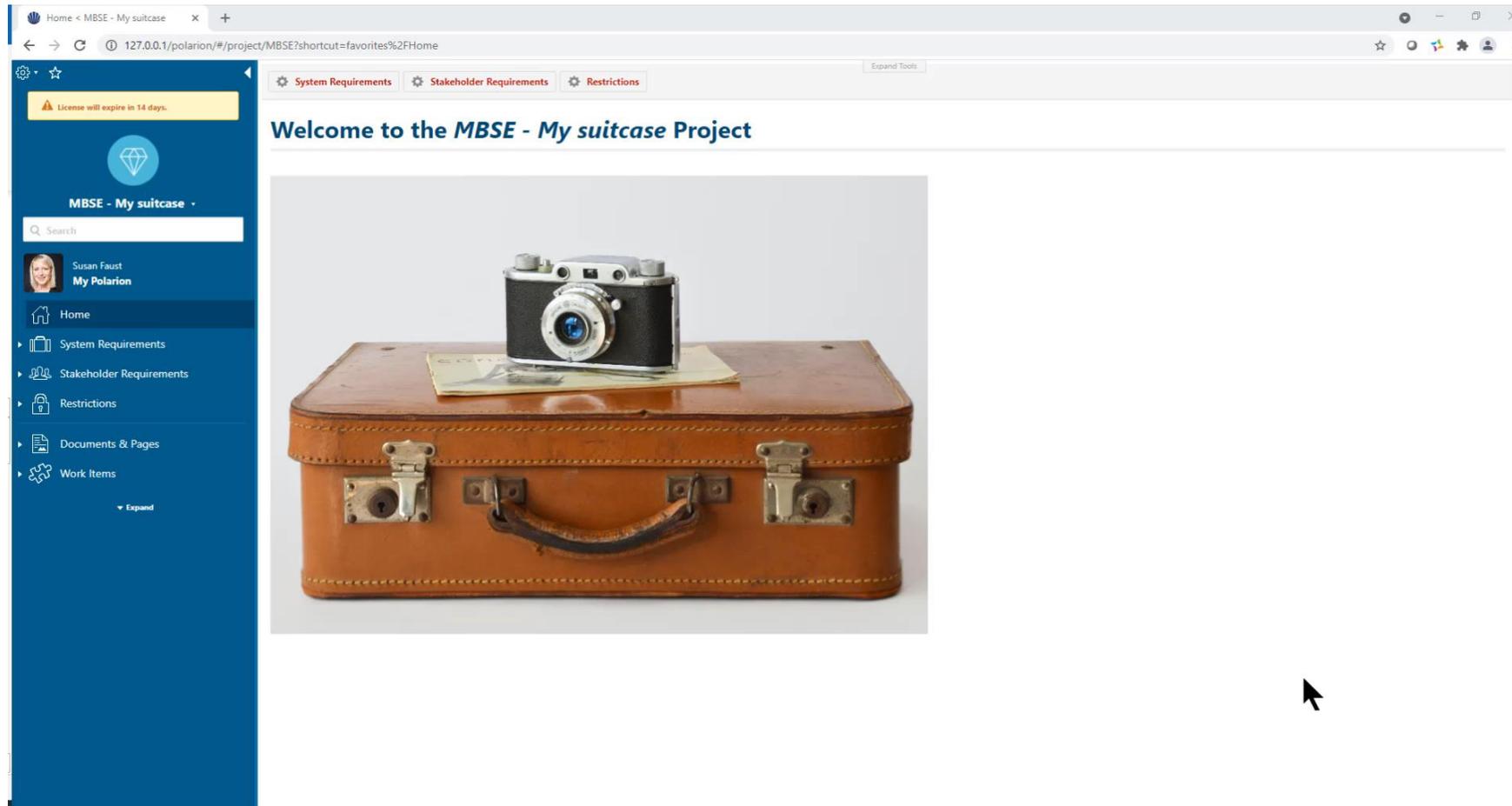
# Phase 2: System Analysis

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



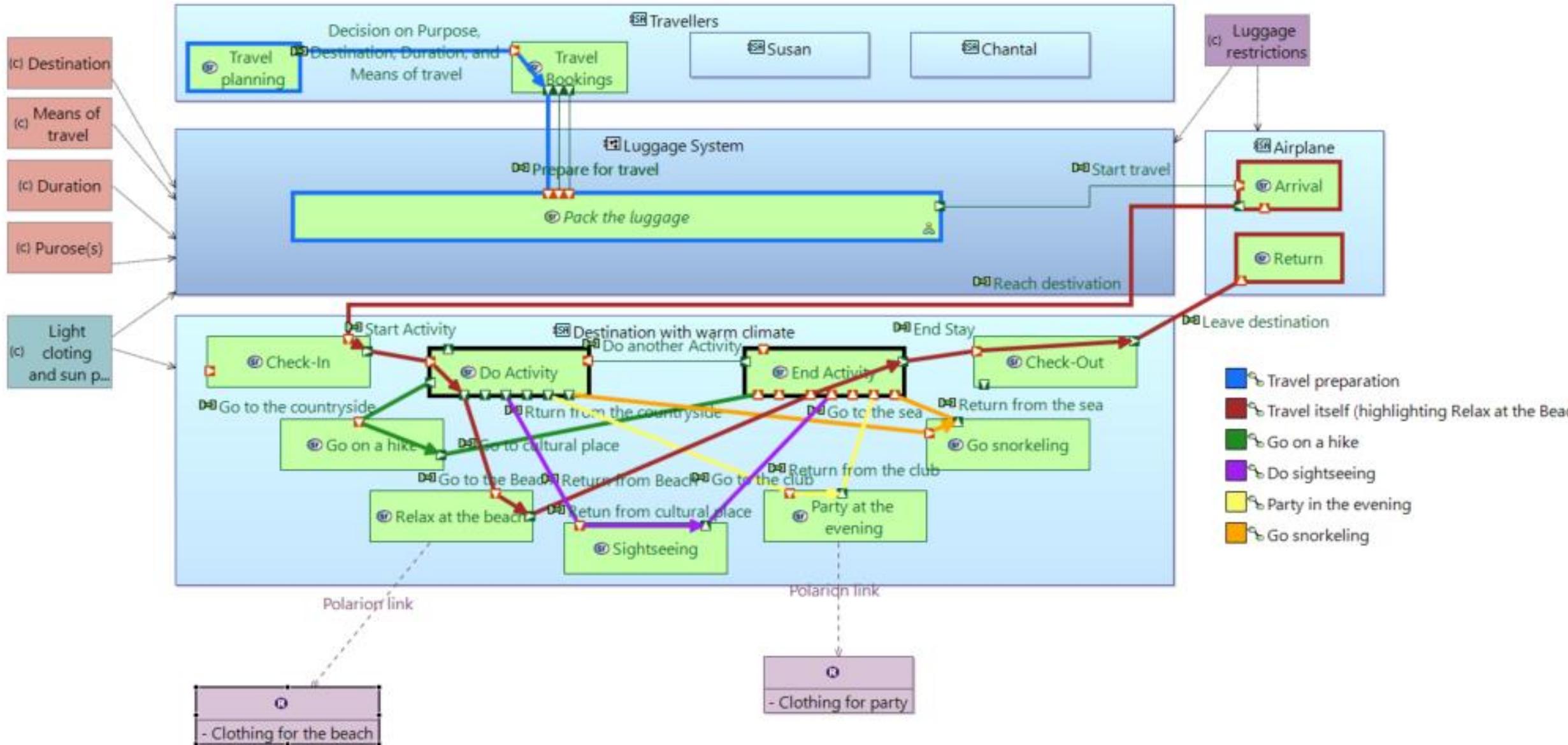
## Phase 2: System Analysis

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



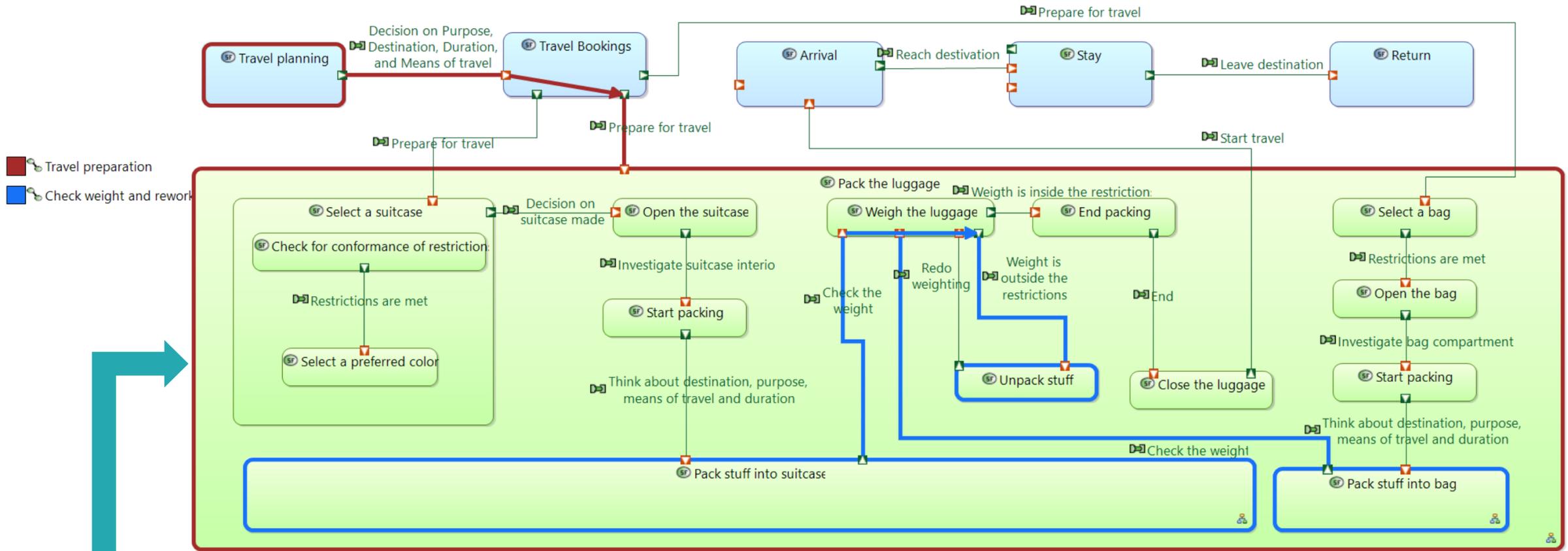
## Phase 2: System Analysis

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



# Phase 2: System Analysis

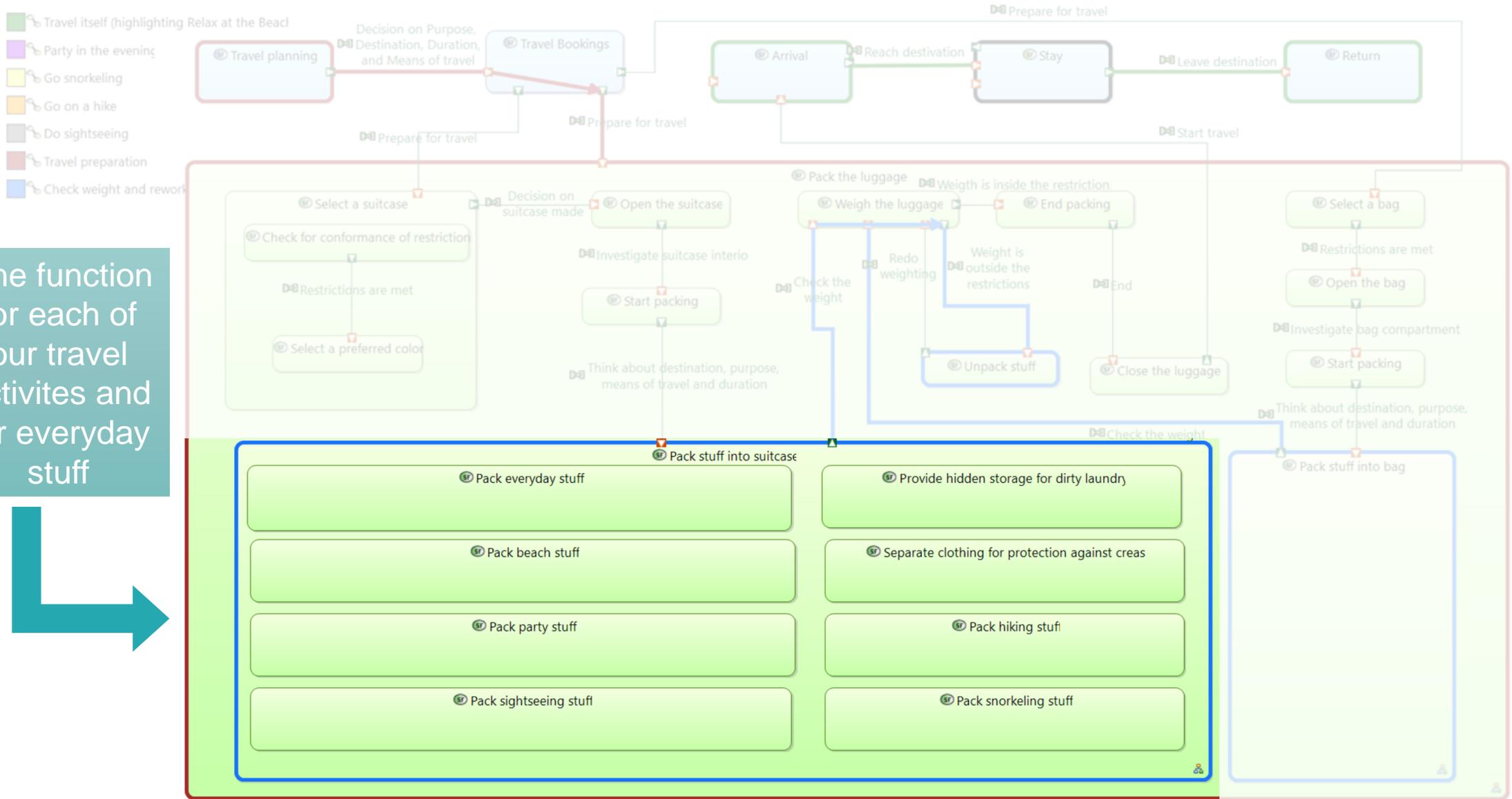
White-Box-perspective of system to specify system functions: general system behavior



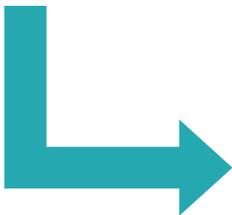
Same steps in travel preparation for every travel

# Phase 2: System Analysis

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

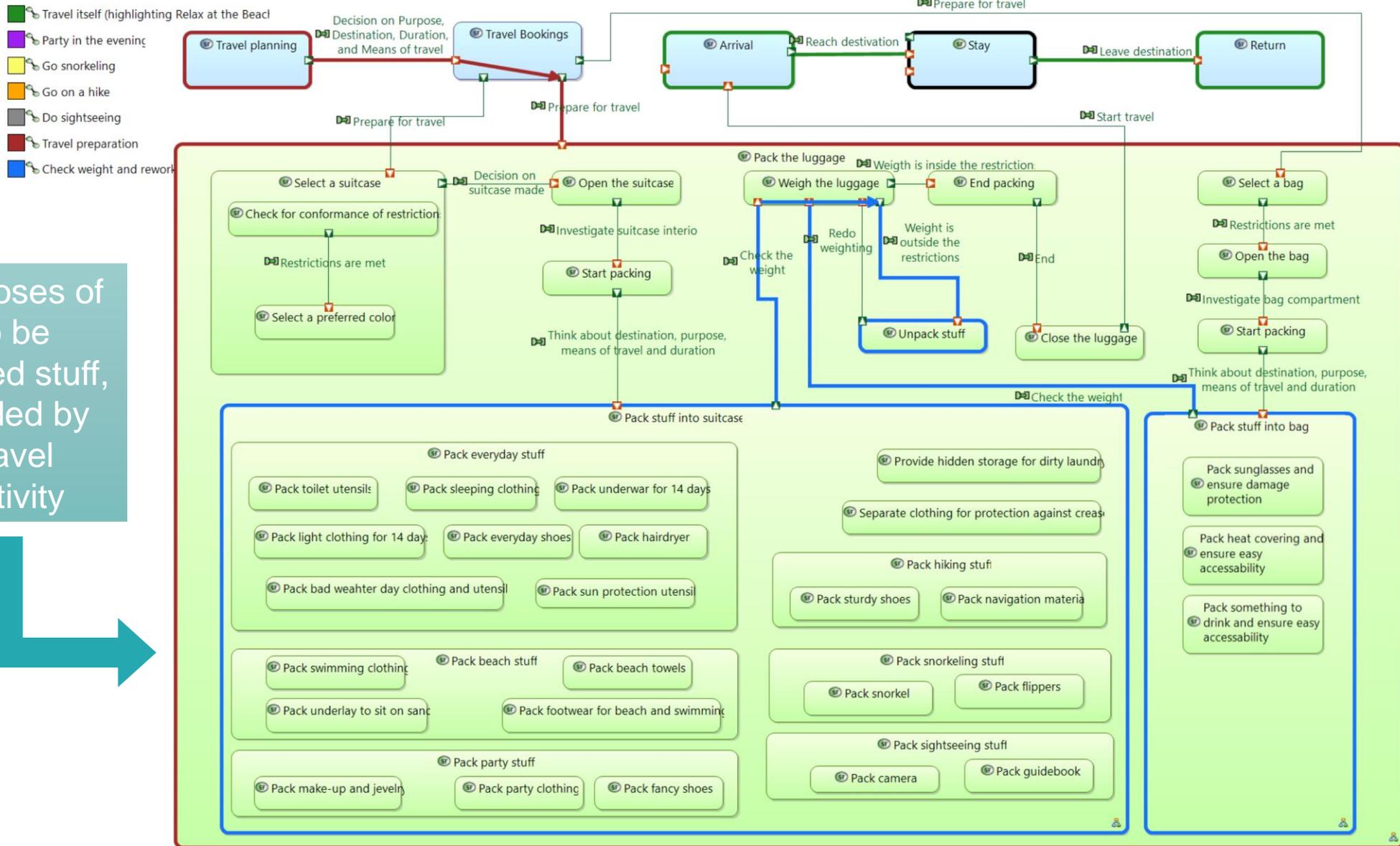


One function for each of our travel activities and for everyday stuff

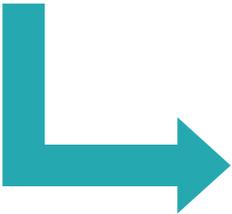


# Phase 2: System Analysis

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

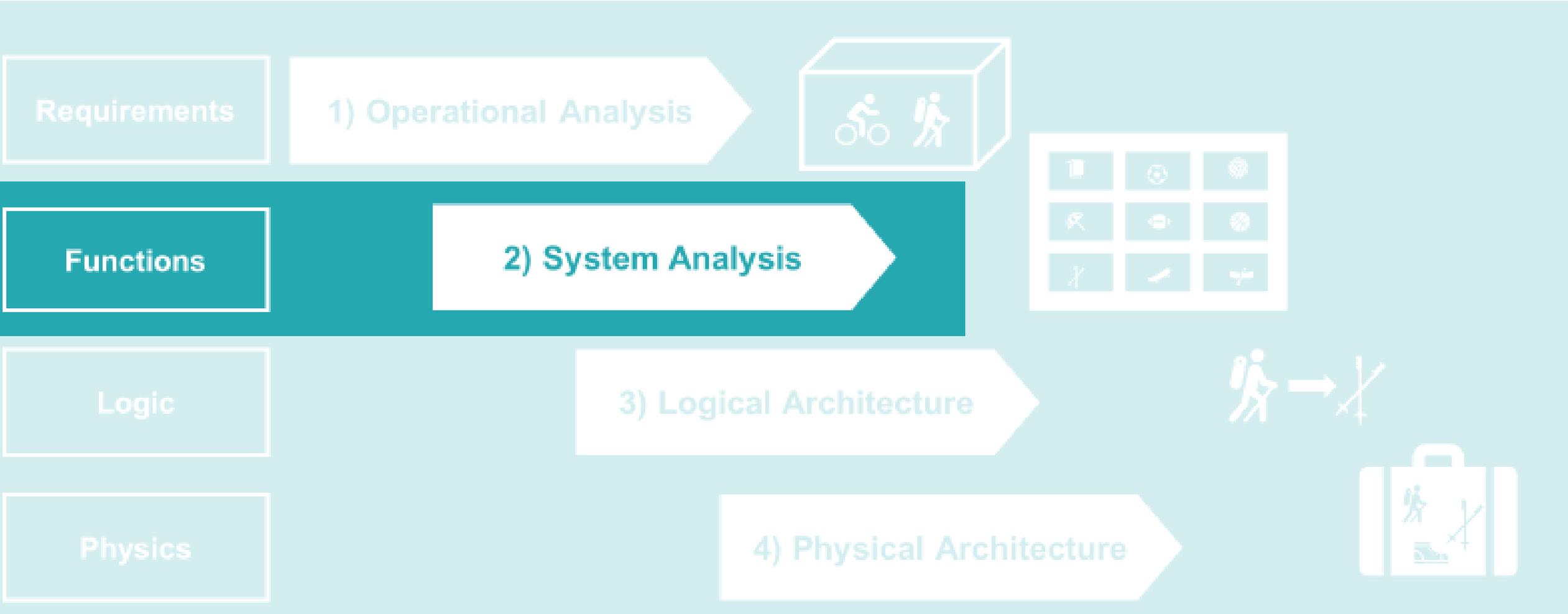


Purposes of to be packed stuff, divided by travel activity



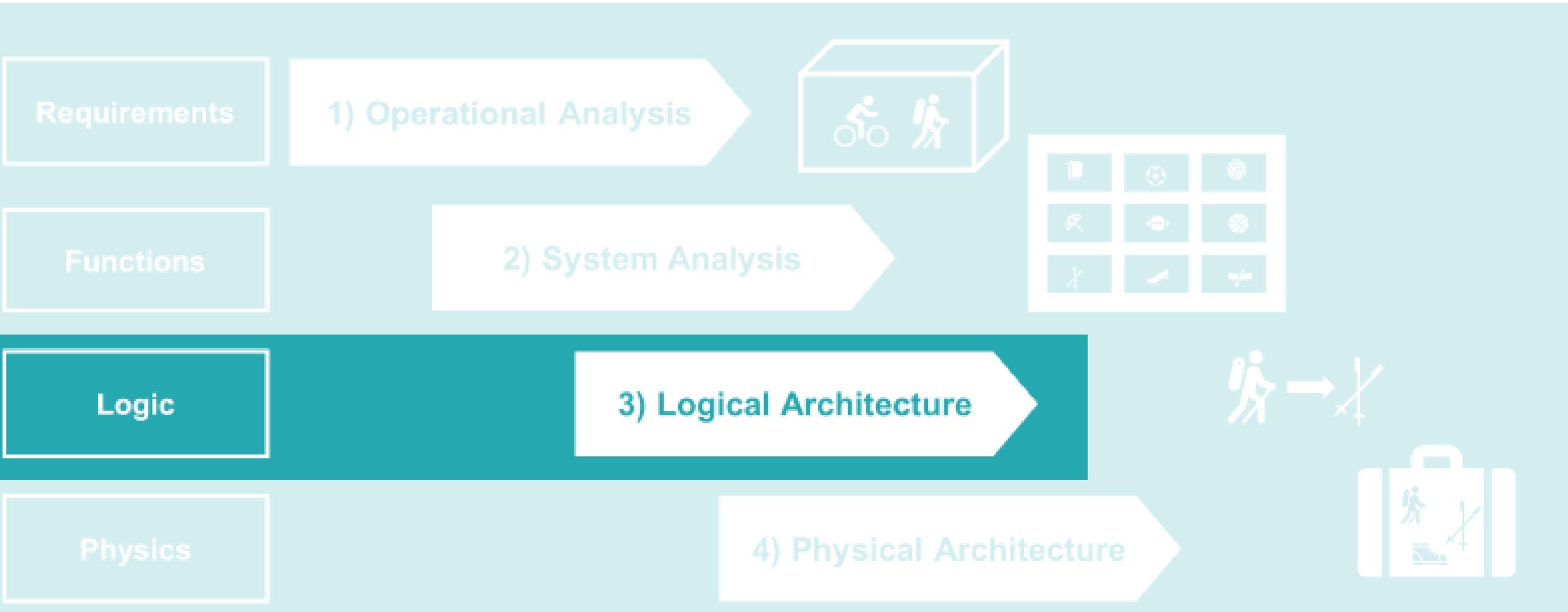
# How to approach step by step this MBSE journey?

## Phase 2: From Black Box to White Box



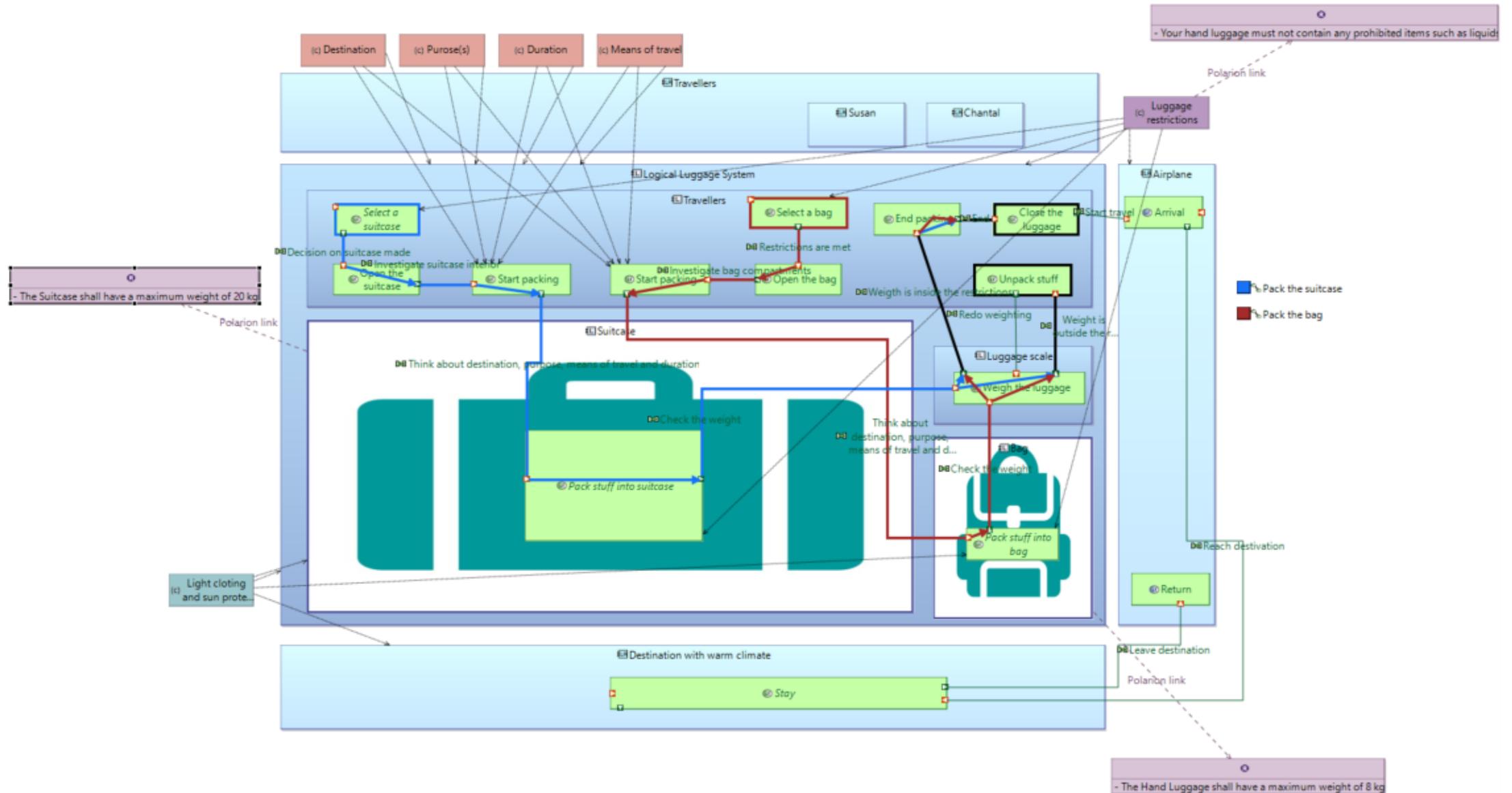
# How to approach step by step this MBSE journey?

## Phase 3: Map System Purpose with System Items



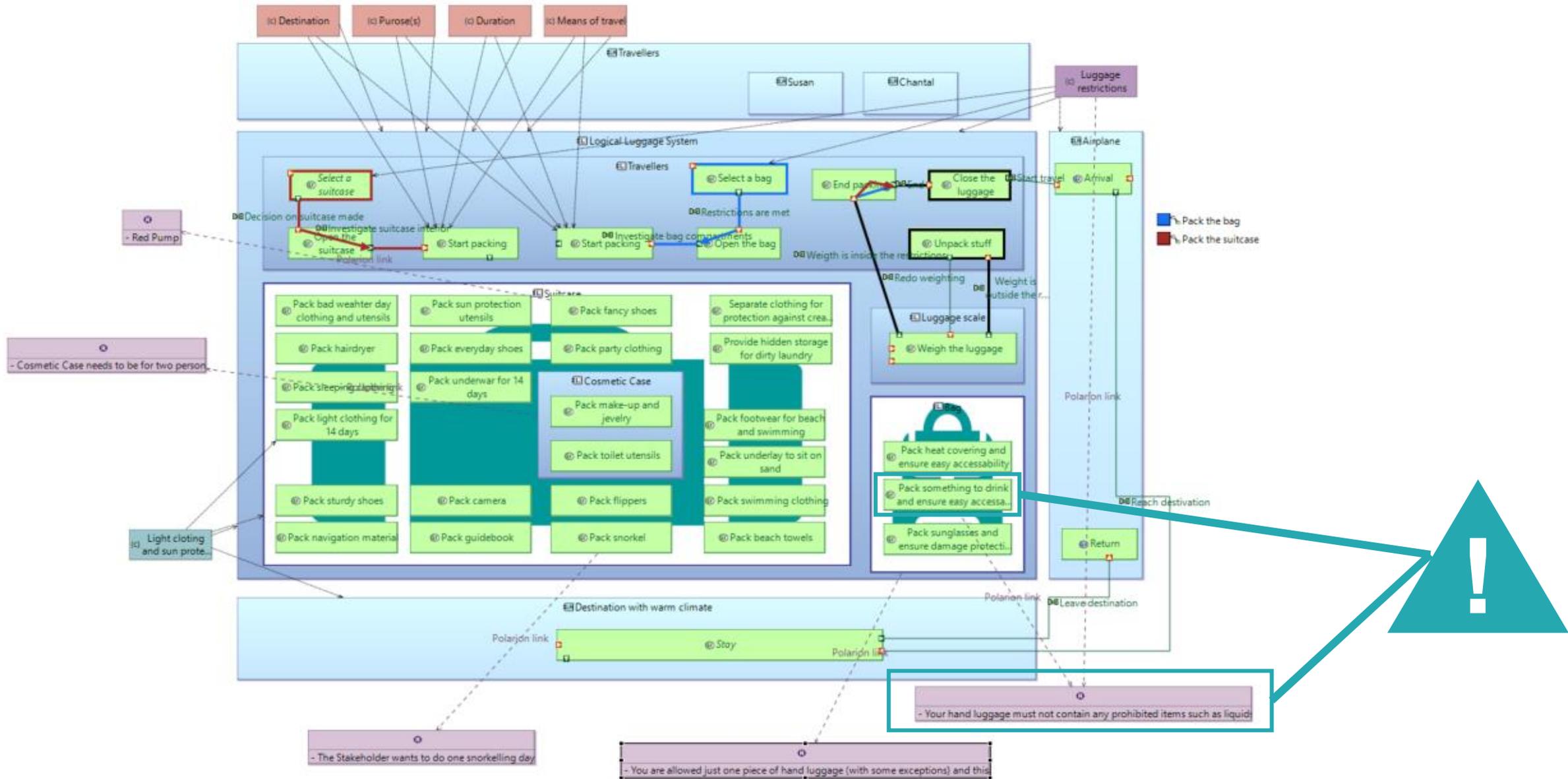
# Phase 3: Logical Architecture

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



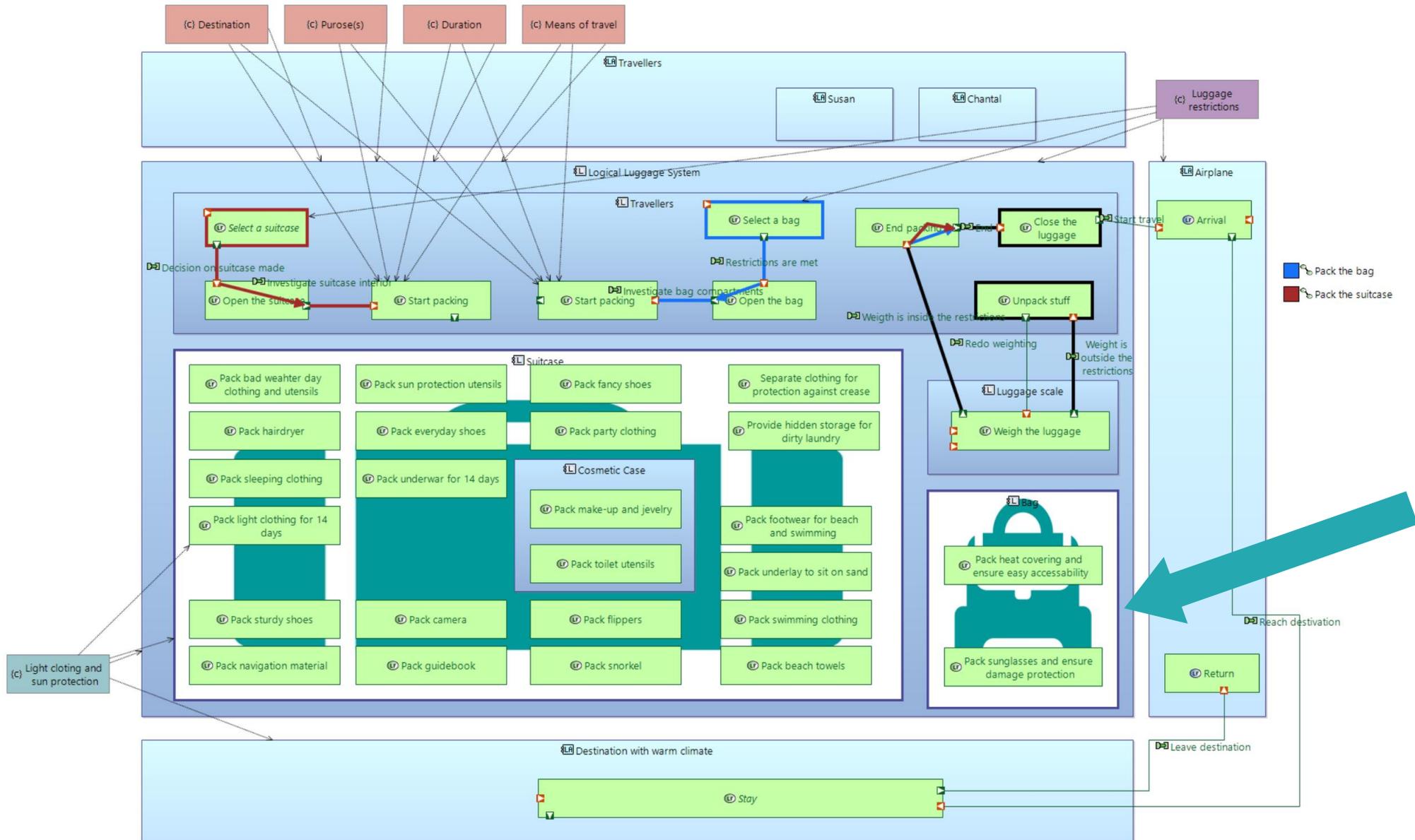
# Phase 3: Logical Architecture

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



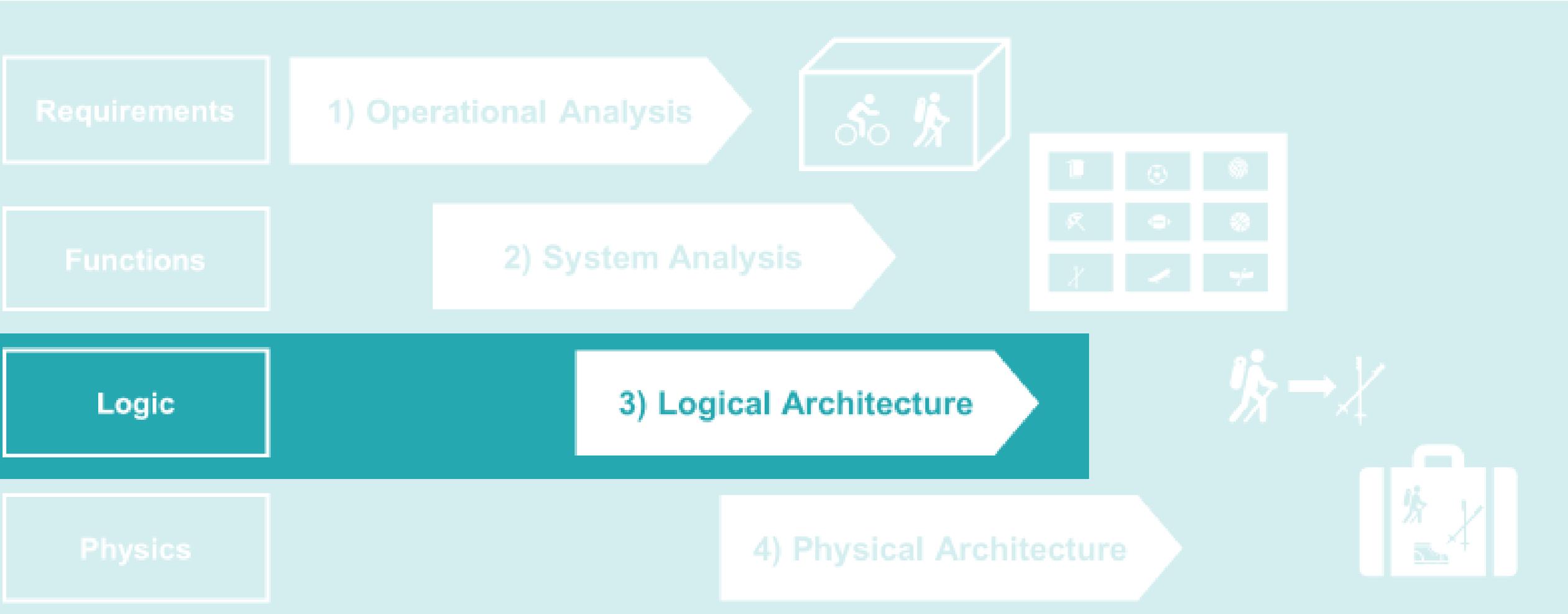
# Phase 3: Logical Architecture

Function-based structure decomposition without obvious violation of luggage restrictions



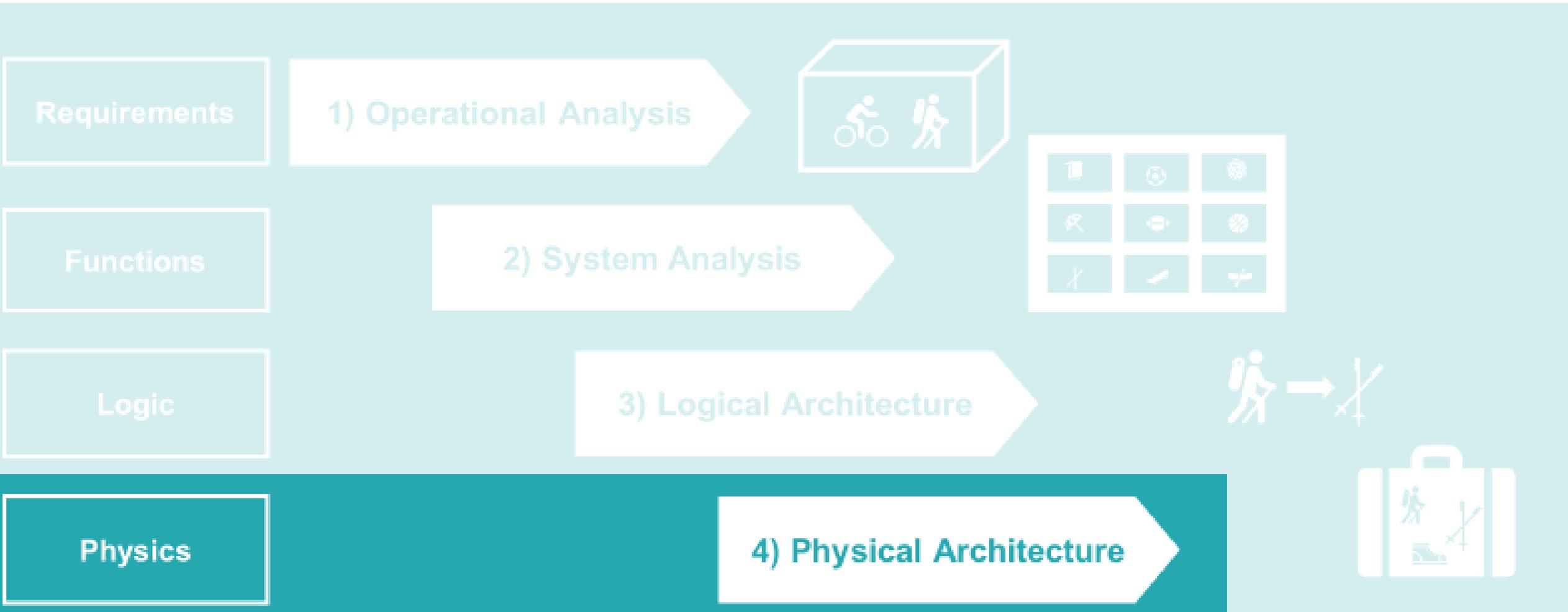
# How to approach step by step this MBSE journey?

## Phase 3: Map System Purpose with System Items



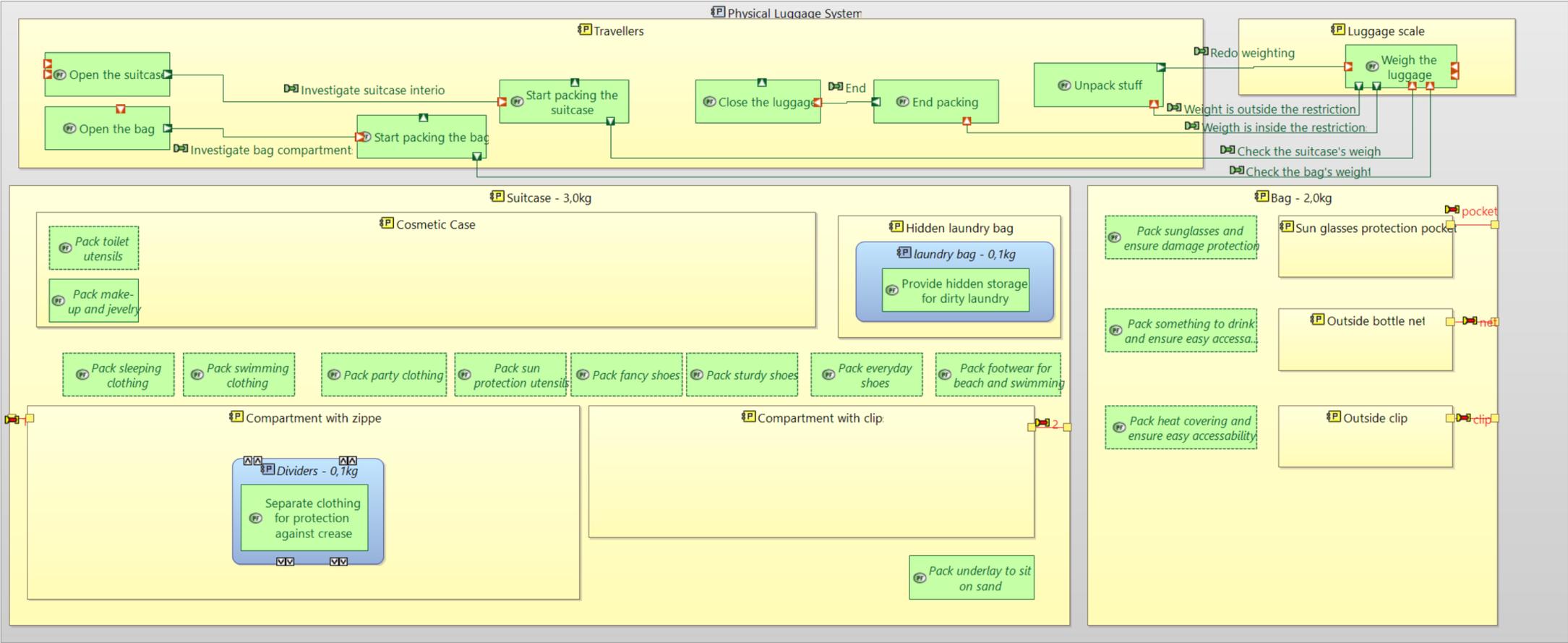
# How to approach step by step this MBSE journey?

Phase 4: What is the physic of your suitcase?



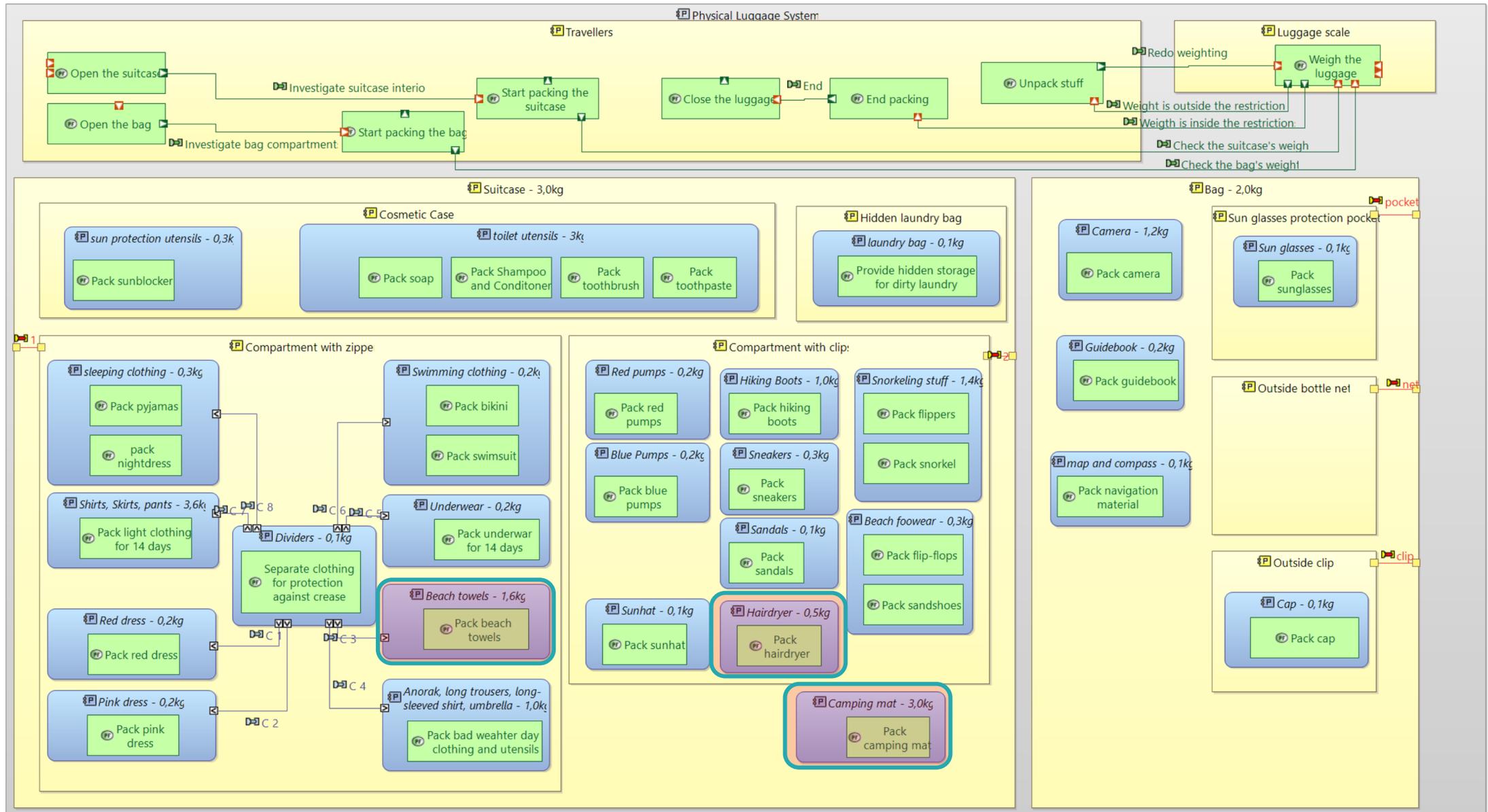
# Phase 4: Physical Architecture

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



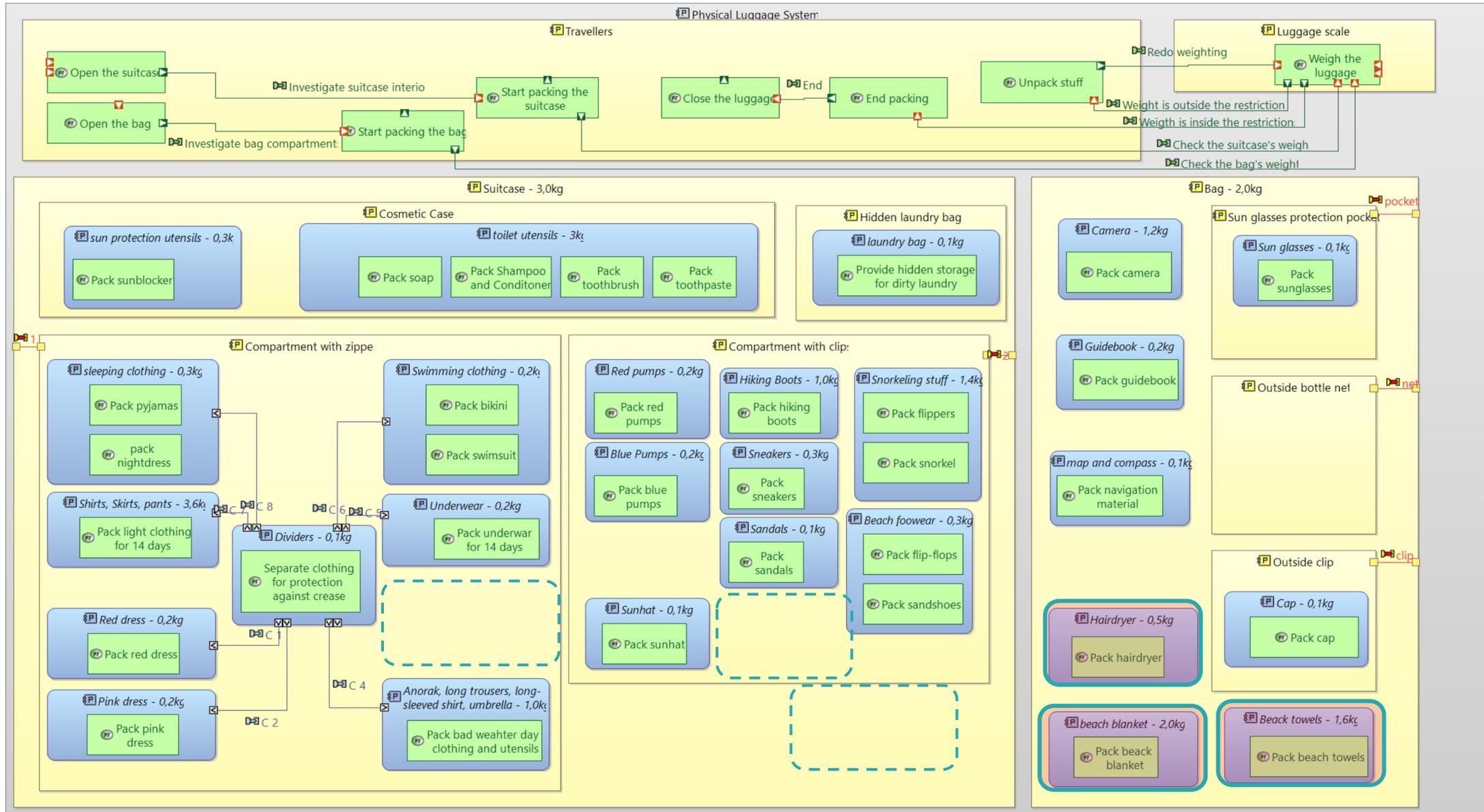
# Phase 4: Physical Architecture

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

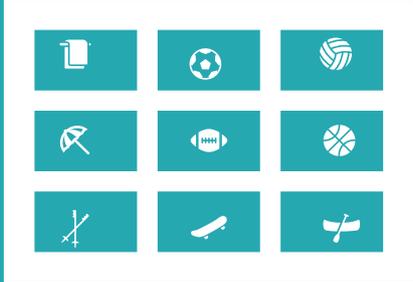


# Four Phases of System Development

1) Operational Analysis



2) System Analysis



3) Logical Architecture

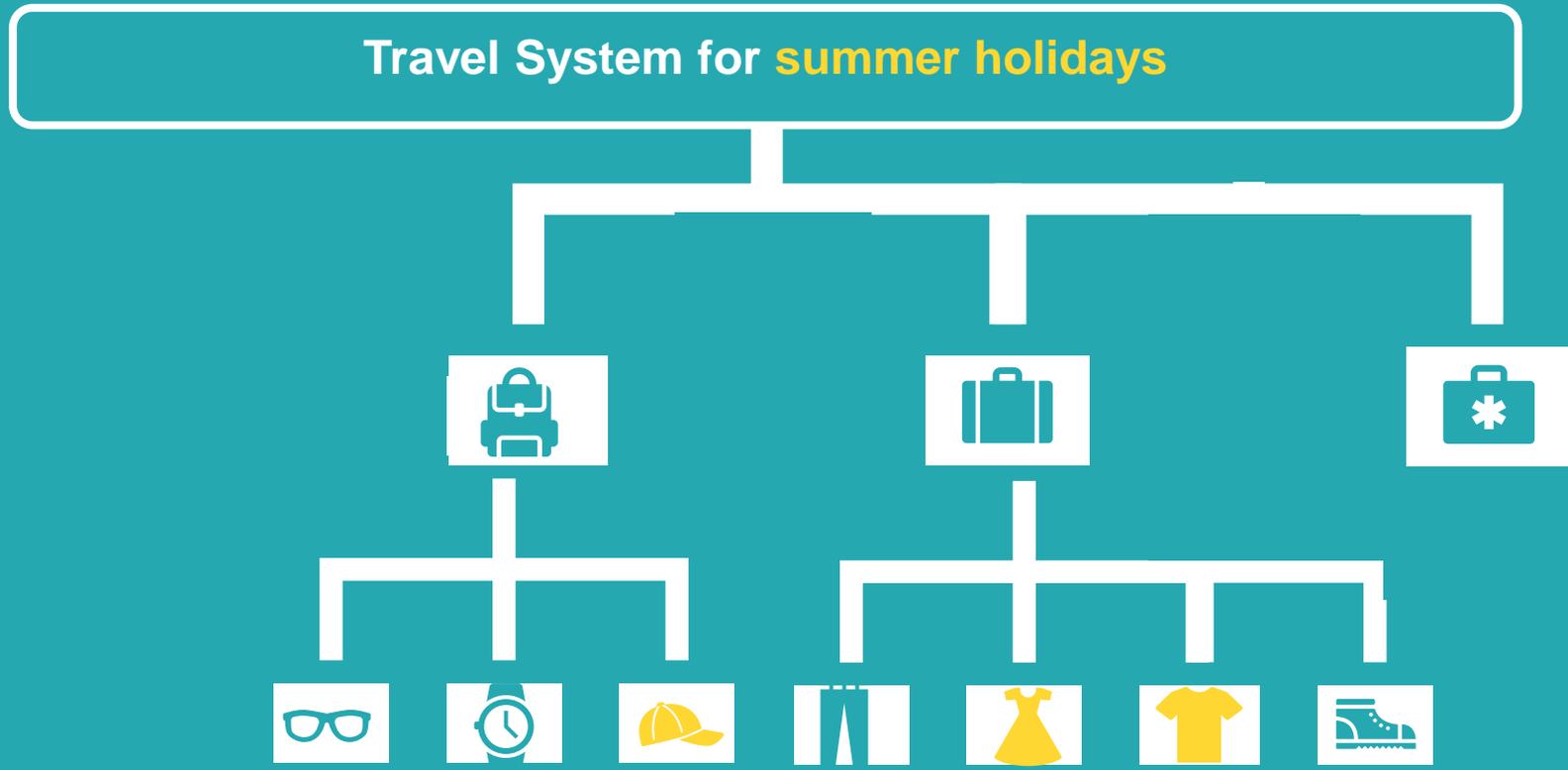


4) Physical Architecture



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

Adapt your system approaches for different holidays



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

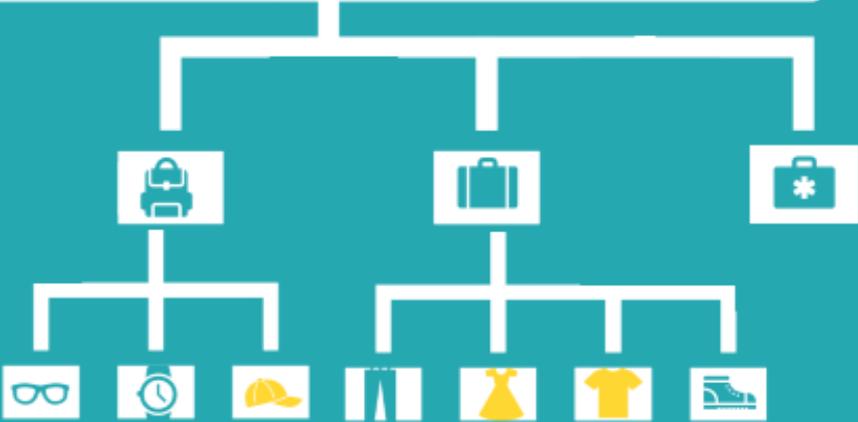
Adapt your system approaches for different holidays



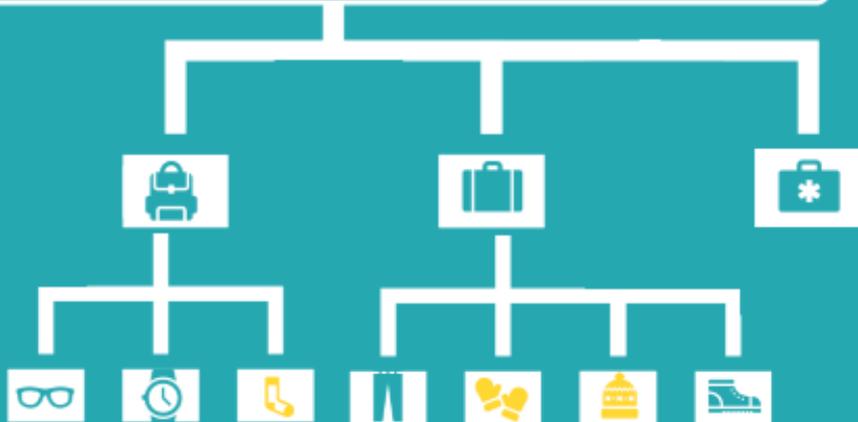
# Outlook

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**



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