



# COST

## COST Action MP1307

*Stable Next Generation Photovoltaics: Unraveling Degradation Mechanisms of Organic Solar Cells by Complementary Characterization Techniques.*

4<sup>rd</sup> MC Meeting and 3<sup>rd</sup> WG Meeting

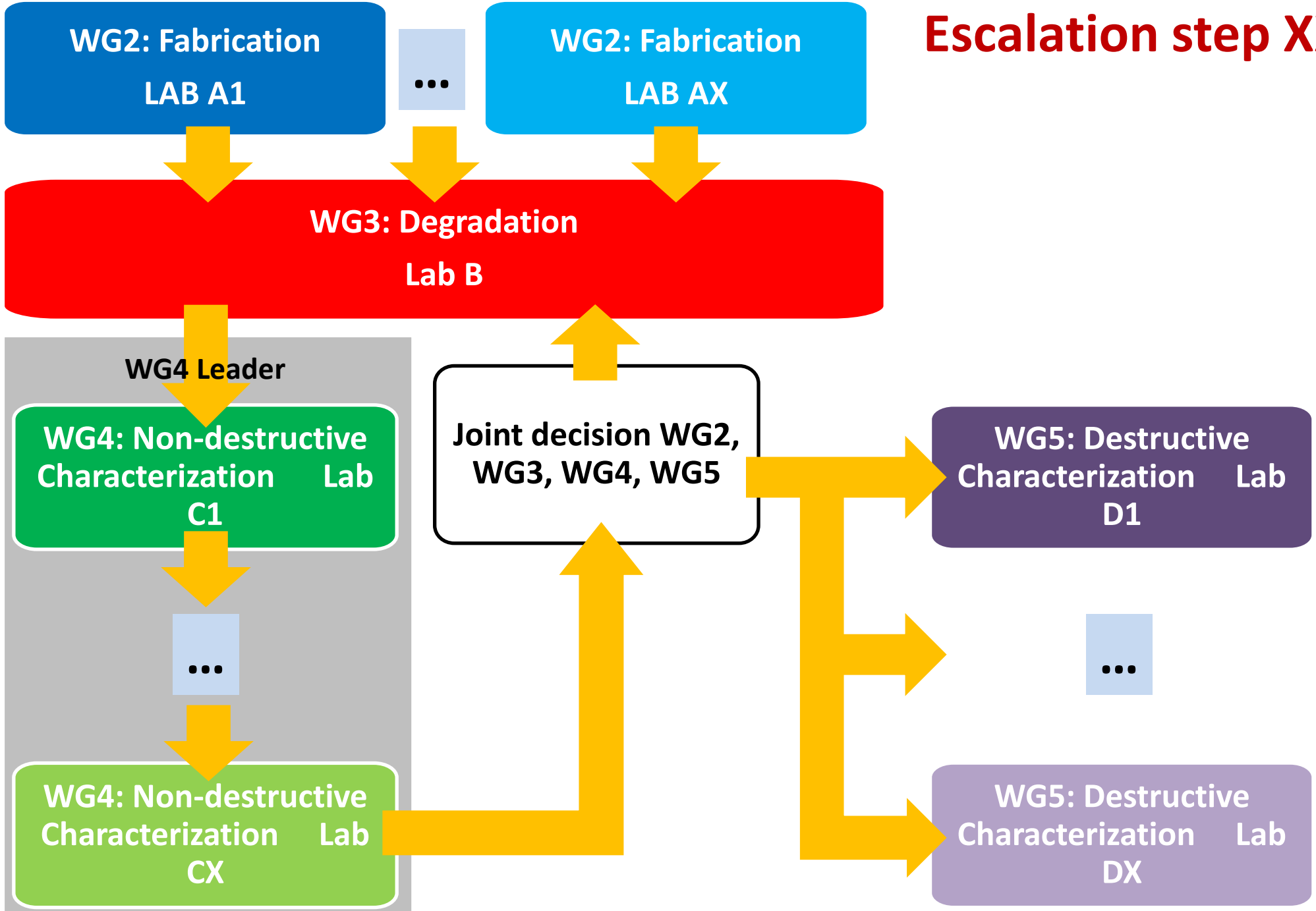
Yulia Galagan

Experiment 4

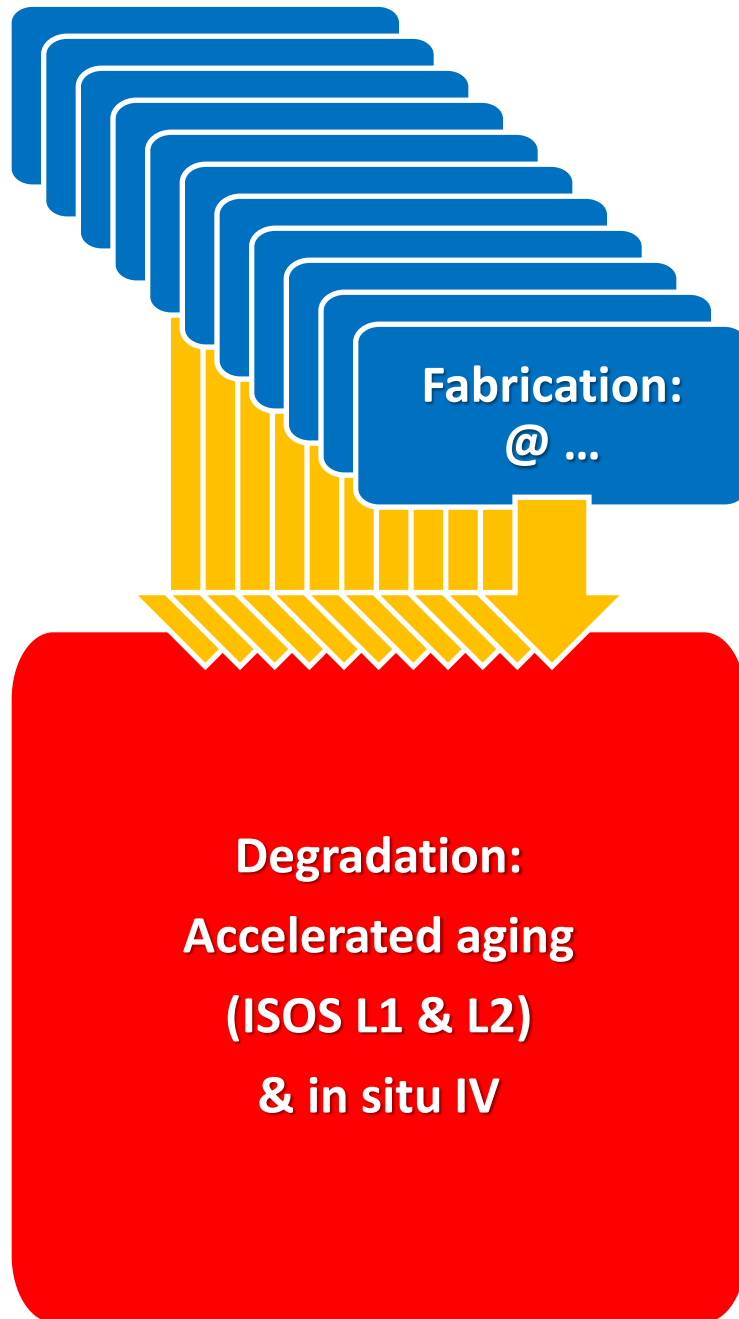
Vilnius University, Lithuania, 19<sup>th</sup>-20<sup>th</sup> October 2015



# Escalation step XX



# Experiment 4





# Task 1:

- Identify the groups are willing to provide devices for the experiment

## Requirements:

- Provide 5-6 reproducible devices
- Crocodiles or wires connections
- Absorber PCDTBT:C70BM (PCDTBT:C60BM)
- Deliver the samples by **1st of December**



## Task 2:

- Identify the Aging Labs

### Requirements:

- ISOS-D-1
- ISOS-L-1
- ISOS-L-2
- 20-40 devices
- Start the aging on **15th of December**

## • Solar Cell Degradation: ISOS Protocols

### ISOS Protocols

#### Dark

[ISOS-D-1](#)

[ISOS-D-2](#)

[ISOS-D-3](#)

#### Outdoor

[ISOS-O-1](#)

[ISOS-O-2](#)

[ISOS-O-3](#)

#### Lab. Weathering

[ISOS-L-1](#)

[ISOS-L-2](#)

[ISOS-L-3](#)

#### Thermal cycling

[ISOS-T-1](#)

[ISOS-T-2](#)

[ISOS-T-3](#)

#### Solar-ther.-hum.

[ISOS-LT-1](#)

[ISOS-LT-2](#)

[ISOS-LT-3](#)

#### ISOS-D-1 Shelf

Light source	None
Temperature <sup>a</sup>	Ambient
Relative humidity (R.H.) <sup>a</sup>	Ambient
Environment <sup>a</sup>	Ambient
Characterization light source	Solar simulator or sunlight
Load <sup>b</sup>	Open circuit
Examples	

*Reference:* Solar Energy Materials & Solar Cells 95 (2011) 1253–1267

#### ISOS-L-2 Laboratory weathering testing

Light source	Simulator
Temperature <sup>a</sup>	Ambient
Relative humidity (R.H.) <sup>a</sup>	Ambient
Environment <sup>a</sup>	Light only e
Characterization light source	Solar simulator
Load <sup>b</sup>	MPP or open circuit
Examples	

#### ISOS-L-2 Laboratory weathering testing

Light source	Simulator
Temperature <sup>a</sup>	65/85 °C
Relative humidity (R.H.) <sup>a</sup>	Ambient
Environment <sup>a</sup>	Light and temperature
Characterization light source	Solar simulator
Load <sup>b</sup>	MPP or open circuit
Examples	



# Objectives

- Introduce research groups producing encapsulated devices
- Identify the most critical parameters for each type of devices
- Via comparison, simple hints can be exchanged enabling Cell Producers to improve their general device stability
- Help each other to produce State of the art devices
- Create a number of follow up experiments

Fabricat

Fabrication

Fabrication: @ ...

WG4: Non-destructive Characterization

Degradation: Accelerated aging  
(ISOS L1 & L2) & in situ IV  
@ University of Jena,  
Germany

Degradation: Concentrated sunlight  
@ Ben-Gurion University of  
the Negev, Israel

Degradation: Radiation tests  
@National Institute for  
Laser, Plasma and Radiation  
Physics, Romania

WG4: Non-destructive Characterization





# Experiment 4

- Experiment 4.A: Device fabrication and optimisation 6 devices
- Experiment 4.B: Concentrated Sunlight 2 devices
- Experiment 4.C: Radiation Tests 2 devices

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10 devices



# New Objectives

- A: Introduce research groups producing encapsulated devices; Help each other to produce State-of-the-art devices
- B: Make preliminary test of the device behavior at concentrated sunlight
- C: Make preliminary test of the device behavior at irradiation
- Create a number of follow up experiments



# Updated Time Frame

- Devices preparation: November 2015
- Devices shipment: 30<sup>th</sup> November 2015
- Non-destructive characterization: 1<sup>st</sup> -15<sup>th</sup> December 2015
- Aging: 15<sup>th</sup> December 2015 – 27<sup>th</sup> January 2016
- Non-destructive characterization: 28<sup>th</sup> January 2015 – 15<sup>th</sup> February



# Action Plan

- Please register your group as a **Cell Produces**  
(Exp. 4A: 6 devices; Exp. 4B: 2 devices; Exp. 4C: 2 devices)
- Please register your group as potential **Accelerated Aging Lab** performing ISOS L1 & L2 (20-40 devices)

**Contact details for registration:**

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### Introduction of new Experiment

### Experiment ???

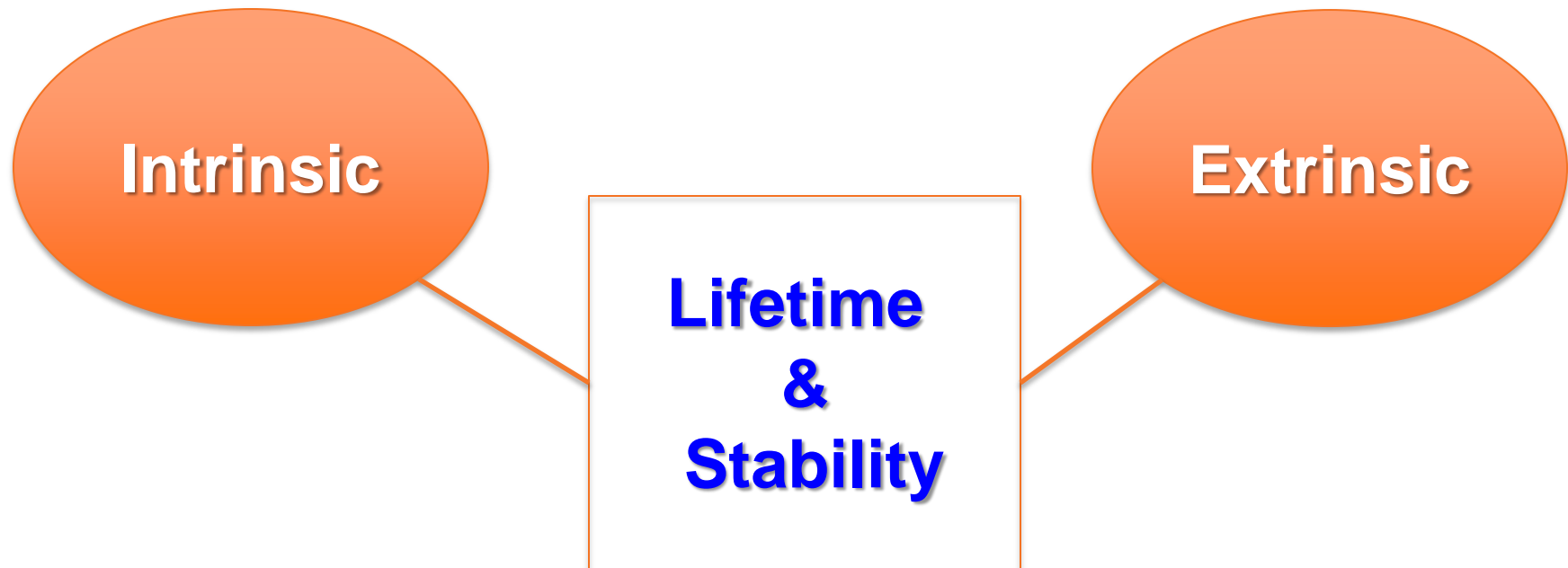
Toni Müller, Mónica Lira-Cantu, Sjoerd Veenstra, Yulia Galagan

Vilnius University, Lithuania, 19<sup>th</sup>-20<sup>th</sup> October 2015

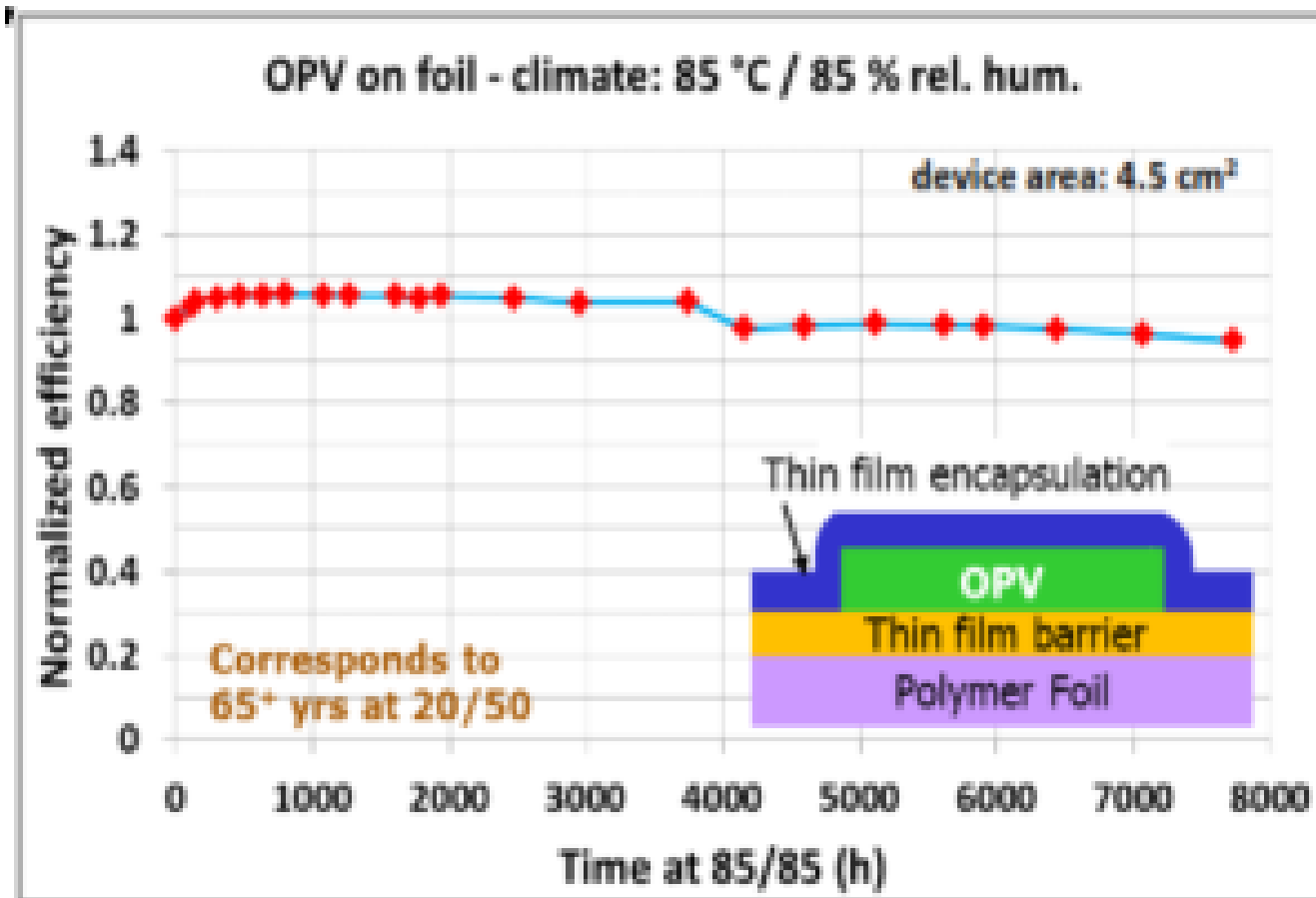


# Idea of the Experiment

- Evaluate quality of the encapsulation



# Heliatek OPV modules



# Chart flow

- Devices fabrication @ Heliatek
    - Performance evaluation
  - Shipment to different labs
    - Performance evaluation
  - Encapsulation @ different labs
    - Performance evaluation
  - Shipment back to Heliatek
    - Performance evaluation
  - Shipment to the aging lab
  - Aging test
- Effect of shipment
- Effect of encapsulation process
- Effect of shipment and first indication of the barrier quality
- Quality of the encapsulation
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# Required Actions

- Define experiment leader
- Define a time frame
- Define the labs willing to participate in the encapsulation test
- Define the aging lab

The logo for eccc cost features a stylized 'e' on the left, composed of a grey outline and a horizontal bar with segments in dark blue, purple, black, and orange. To the right of the 'e' is the text 'ccc cost' in a grey, blocky, sans-serif font.

eccc cost

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