



SIMULATION VS. MEASUREMENT

OPTIS Northern Europe Ltd.
The Atrium - The Innovation Centre
Sci-Tech Daresbury

9th March 2016

OVERVIEW

- Introduction
- Measurements & simulations
- Comparison
- Next steps...

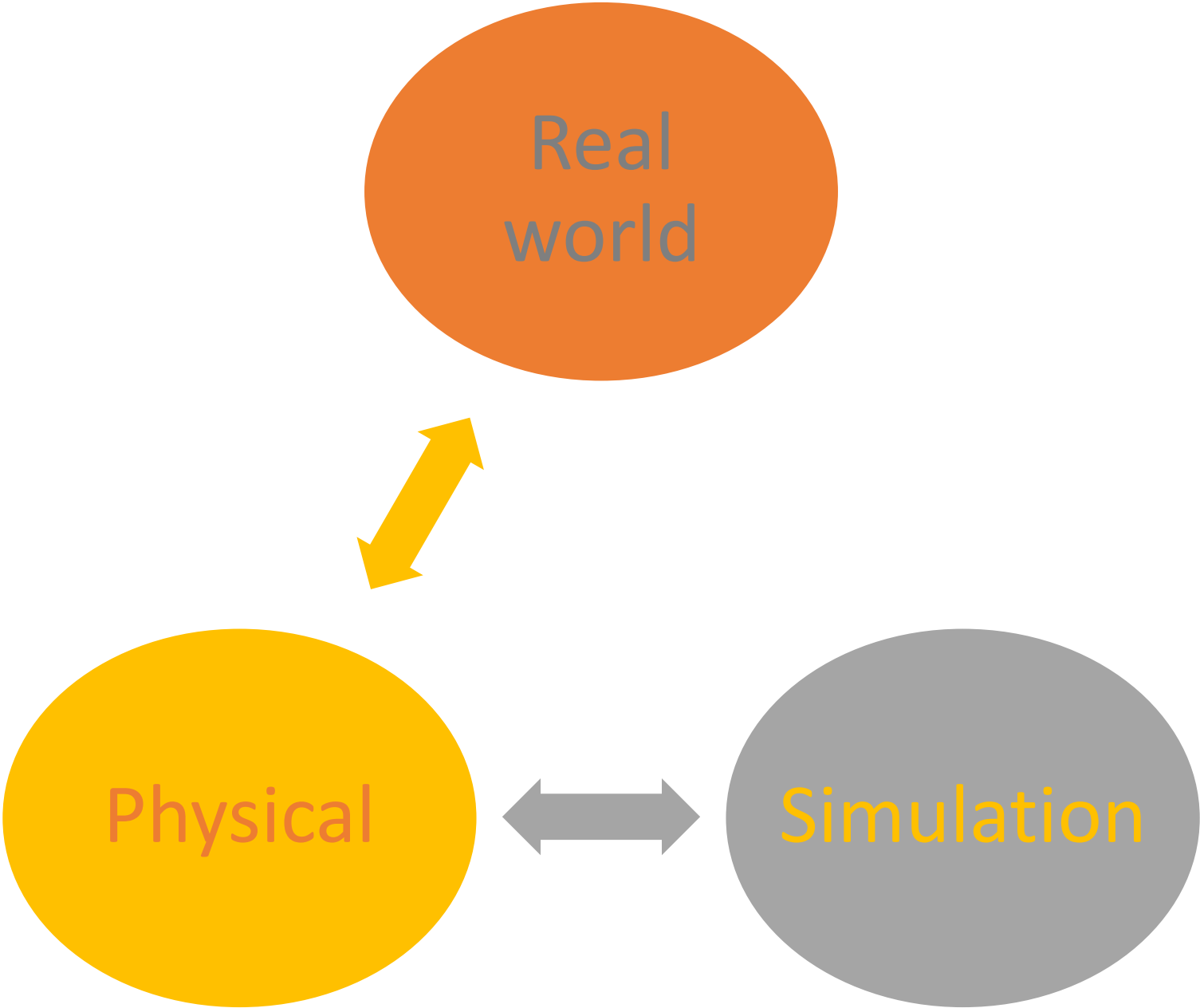
INTRODUCTION

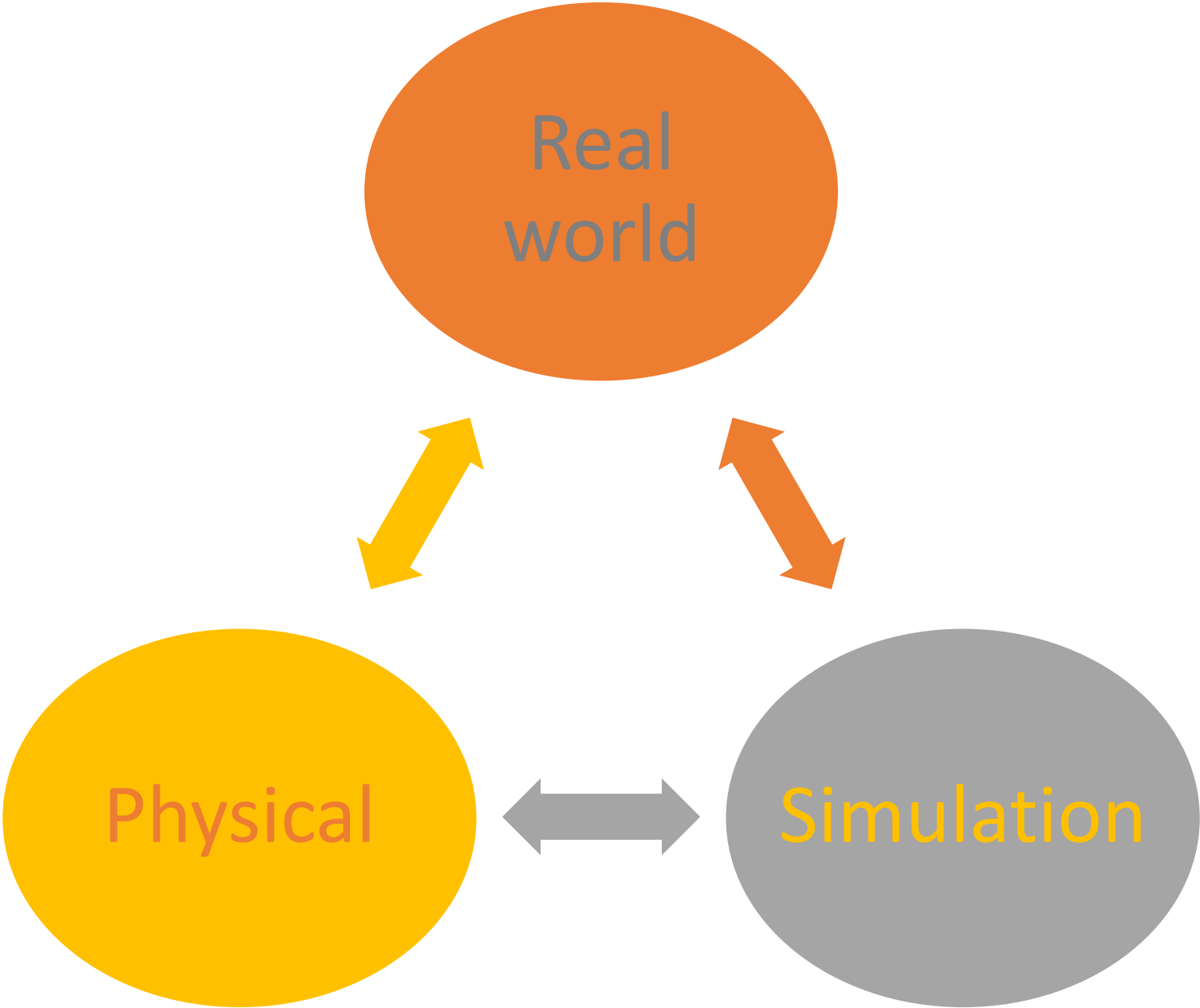


A diagram consisting of two ovals. The top oval is orange and contains the text "Real world". The bottom oval is yellow and contains the text "Physical". A yellow double-headed arrow connects the two ovals, indicating a bidirectional relationship between the two concepts.

Real
world

Physical





KEY OBJECTIVES

- Determine the gap between real world, simulations and lab-based assessments
- Propose a physical method for recreating daylight and performing in-vehicle evaluations
- Verify the use of SPEOS simulations for use in in-vehicle display assessments

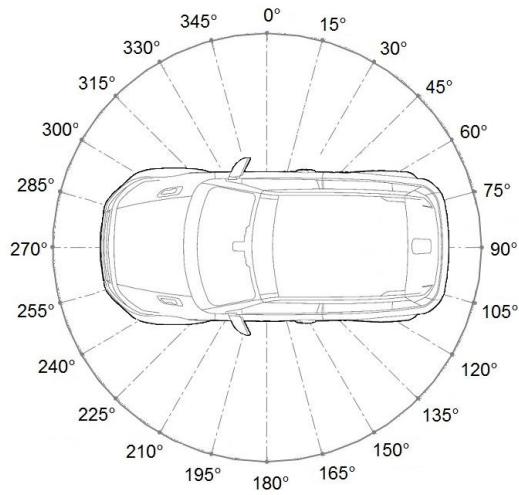


MEASUREMENTS

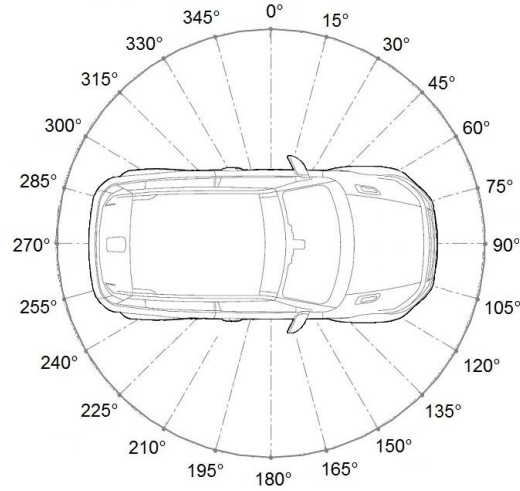
Australia,
January 2015



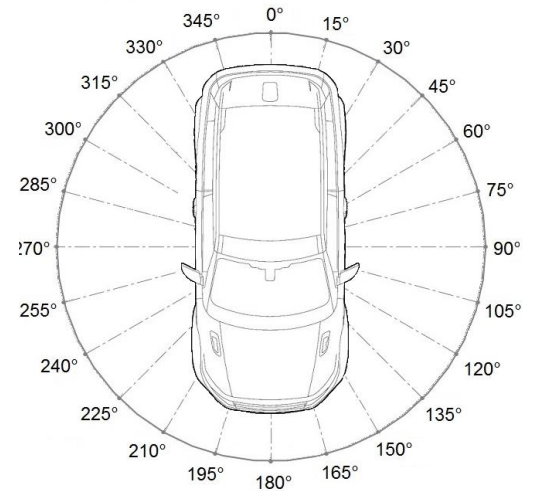
Sun Driver



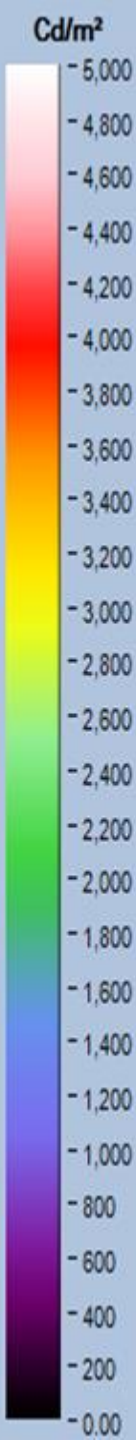
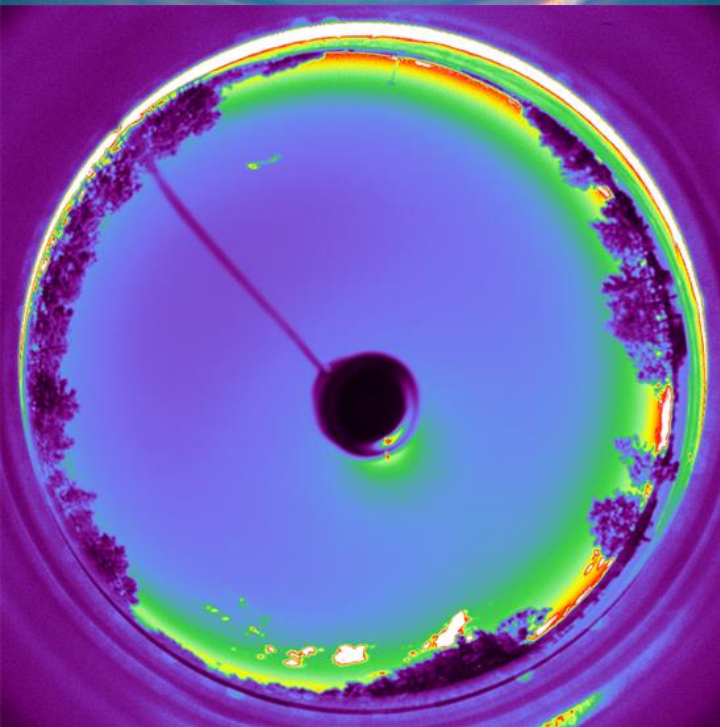
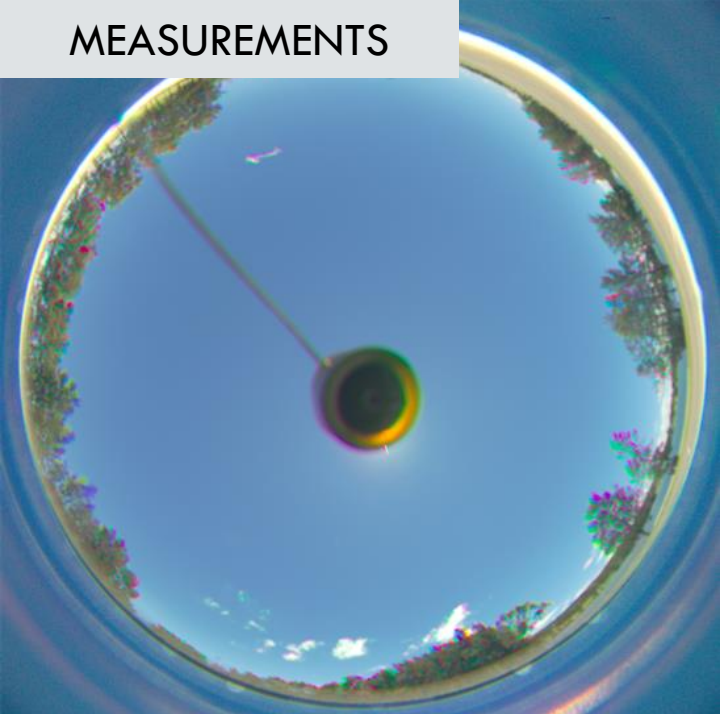
Sun Passenger



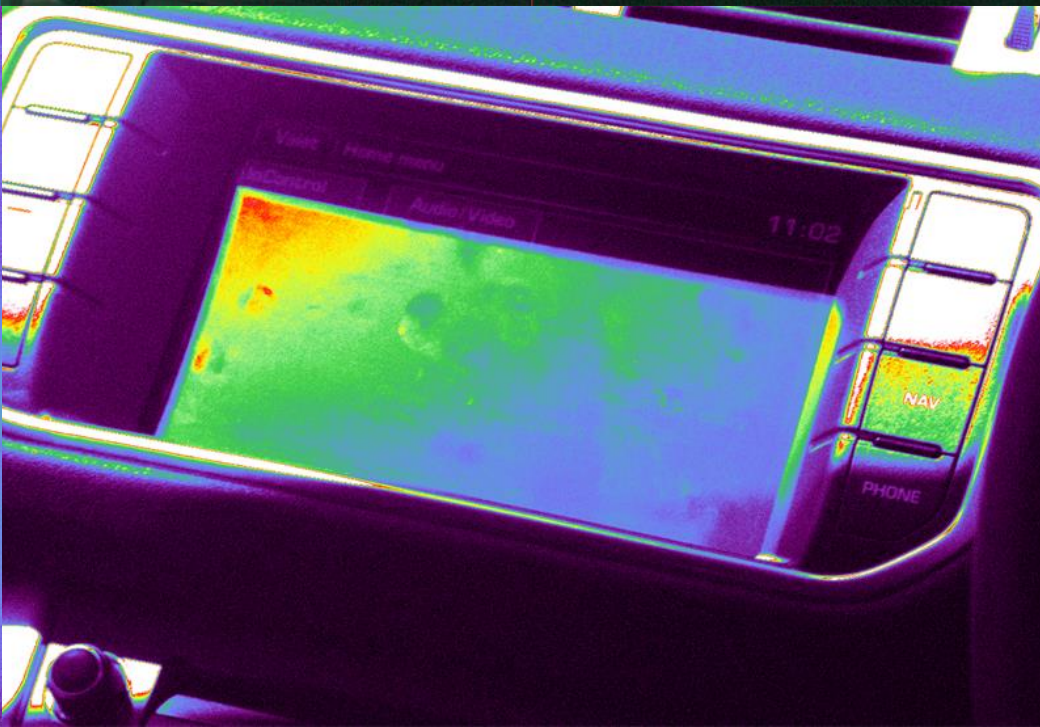
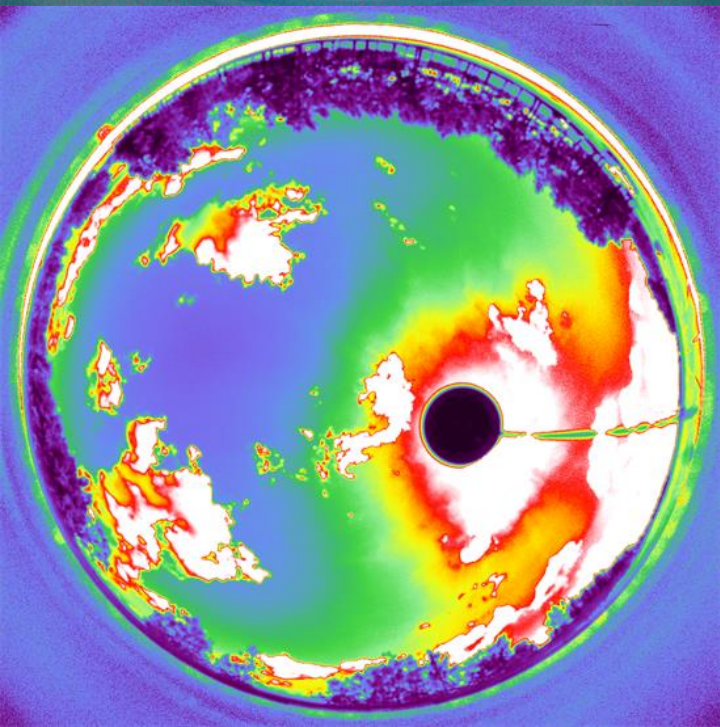
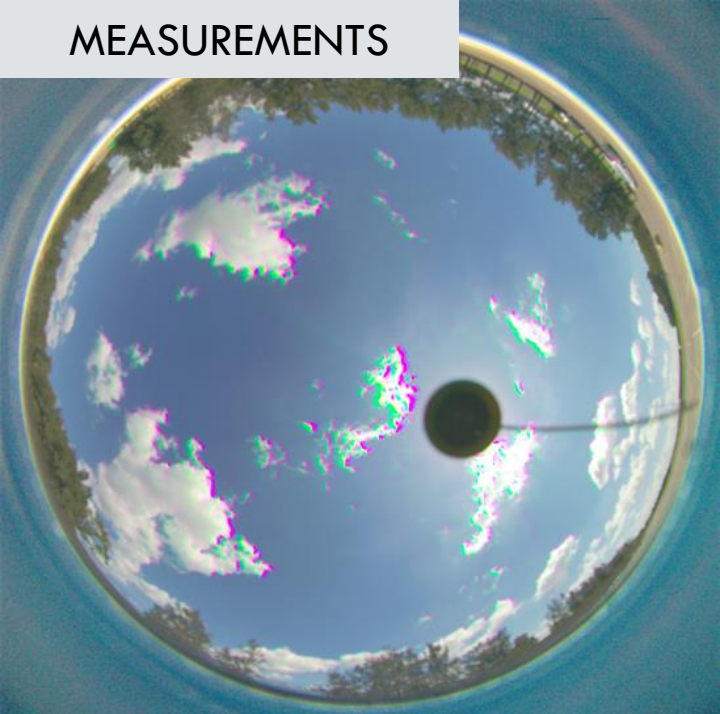
Sun Rear



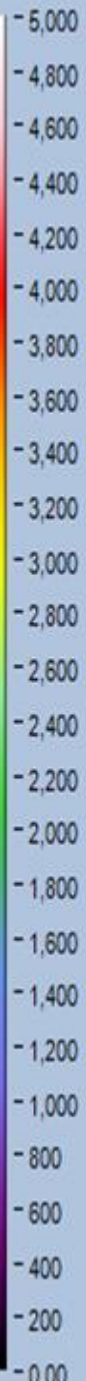
MEASUREMENTS

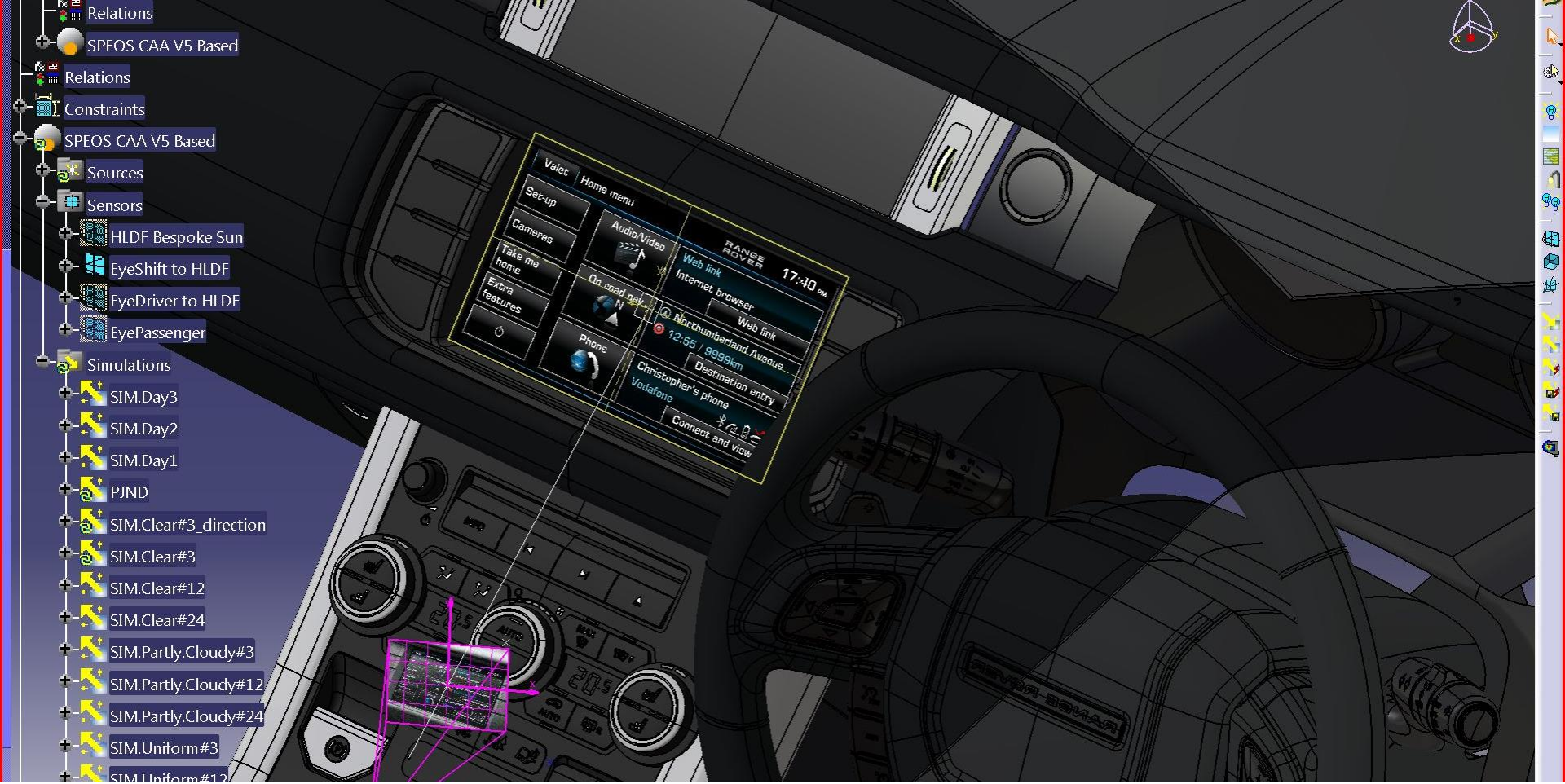


MEASUREMENTS

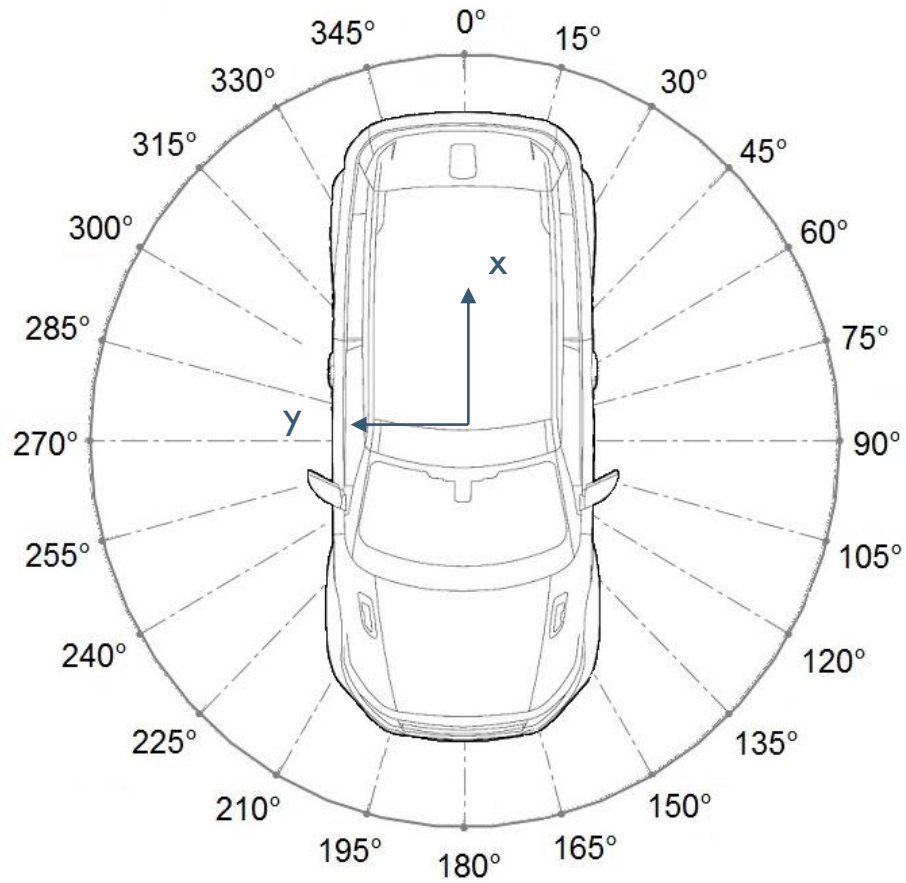


Cd/m²





SIMULATIONS



alignment between CAD and compass orientations

SIMULATION RESULT



Valet Home menu

RANGE ROVER

17:40 PM

Set-up

Cameras

Take me home

Extra features



Audio/Video



On road nav



Phone



Web link

Internet browser

Web link

Northumberland Avenue
12:55 / 9999km

Destination entry

Christopher's phone
Vodafone

Connect and view





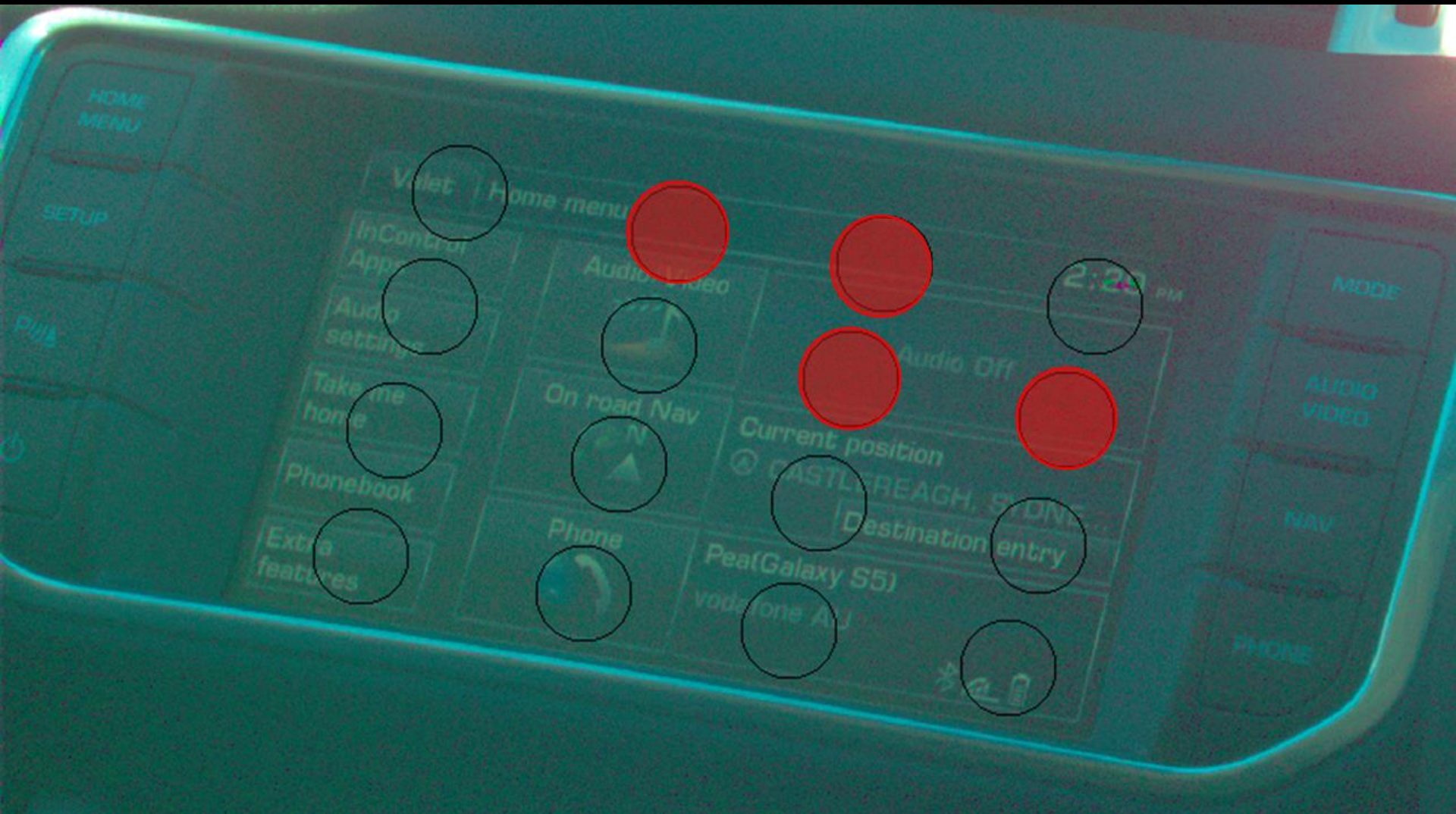
COMPARISON

MEASUREMENTS – 16 POINTS OF INTEREST



MEASUREMENTS – SAMPLE FOREGROUND AND BACKGROUND PIXELS





HOME MENU

SETUP

PIUA

Valet Home menu

InControl Apps

Audio settings

Take me home

Phonebook

Extra features

Audio Video

On road Nav

Phone

Current position

CASTLE REAGH, SYDNEY

Destination entry

Pea(Galaxy S5)

vodafone AU

2:23 PM

Audio Off

MODE

AUDIO VIDEO

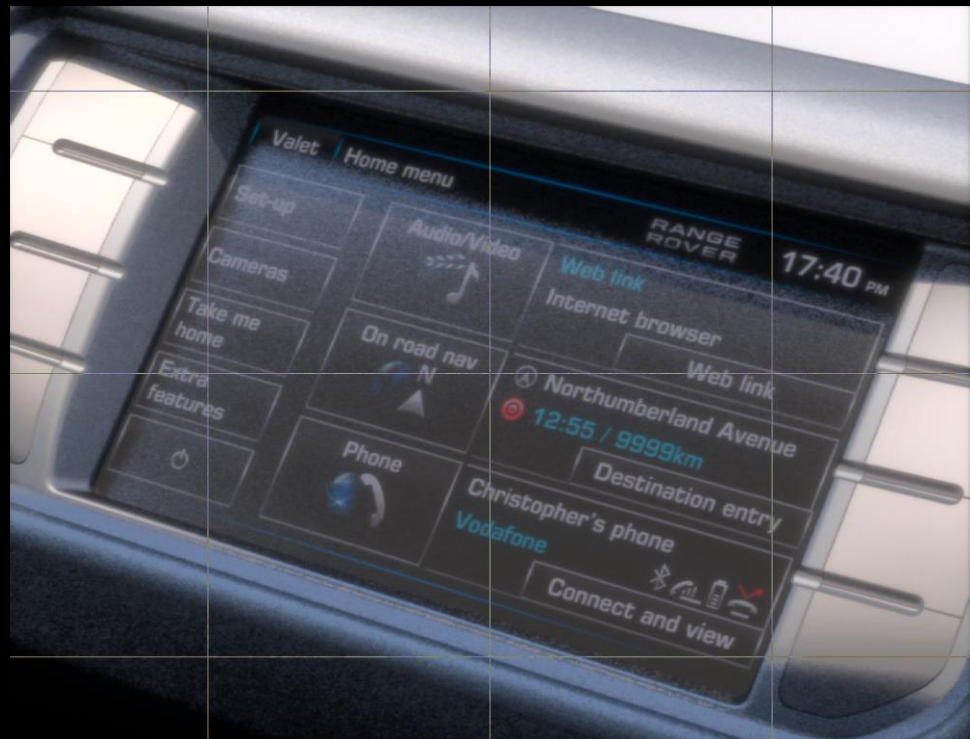
NAV

PHONE

MEASUREMENT



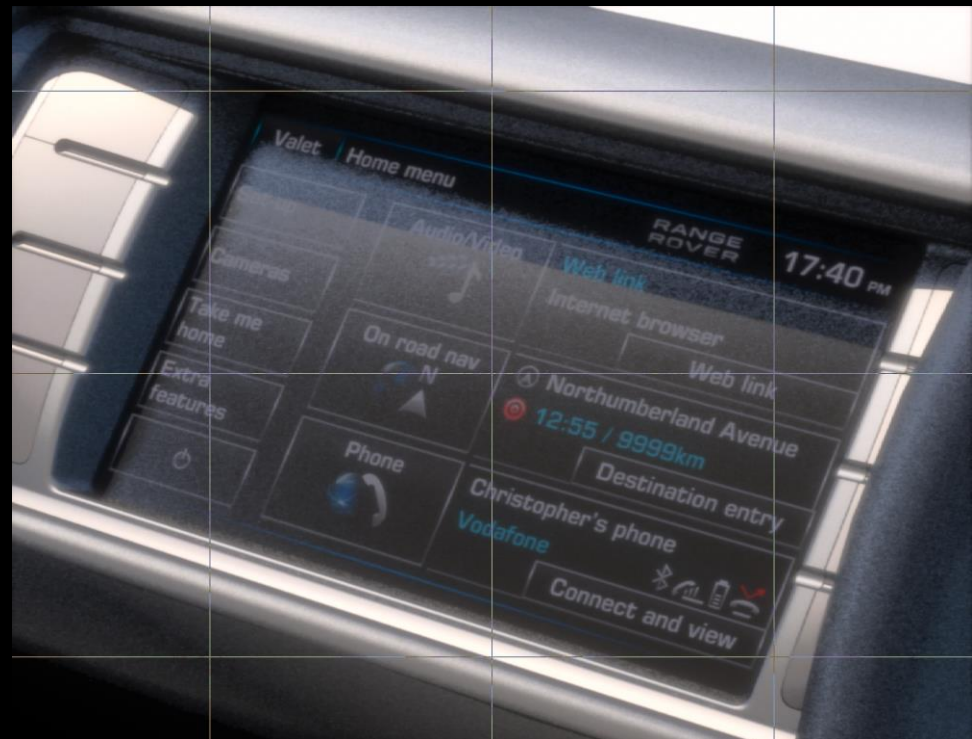
SIMULATION



MEASUREMENT



SIMULATION



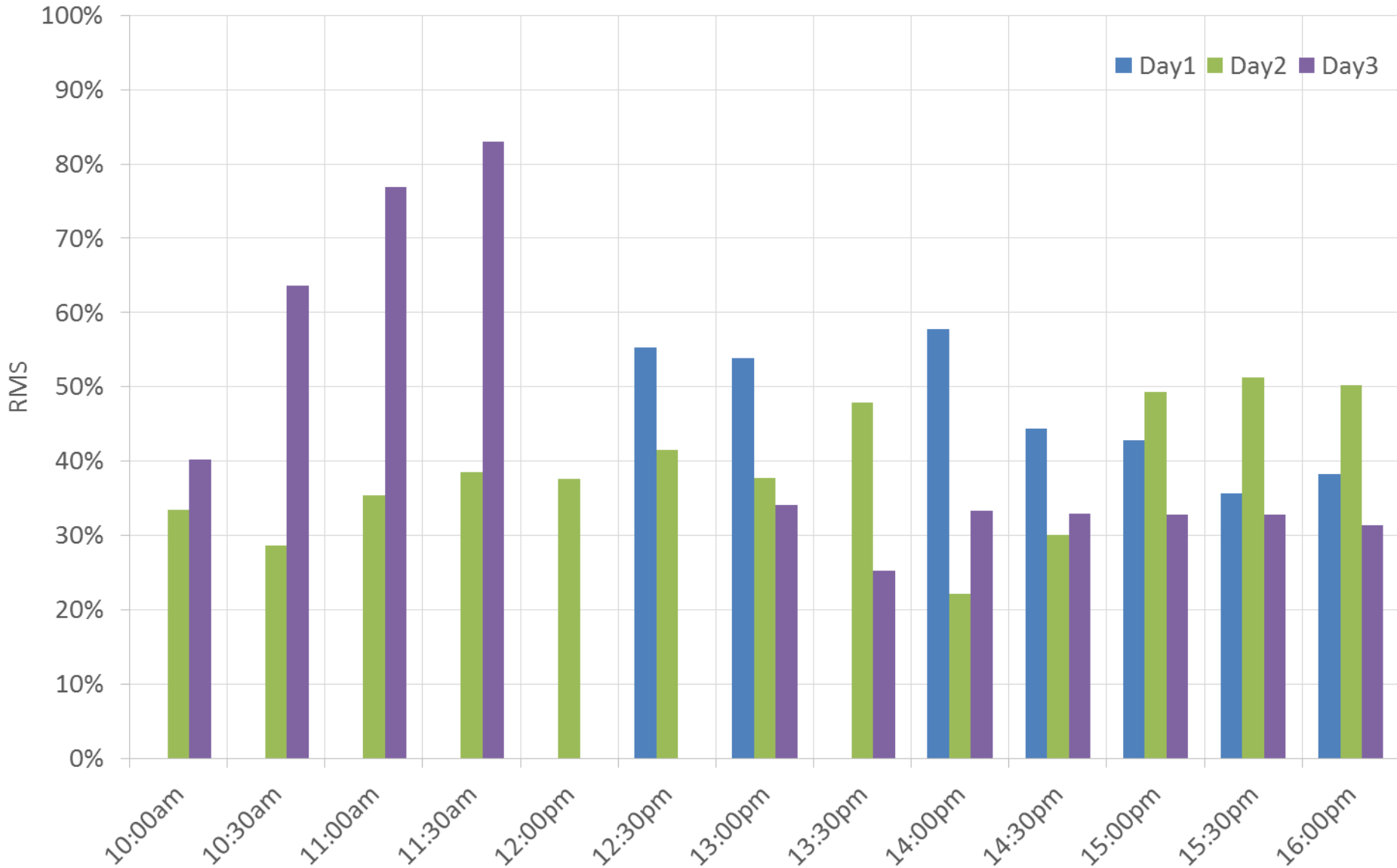
PJND of feature

item	Display	Sim	Difference	% Difference
#3_P1	46.14	91.59	45.45	98%
#3_P2	3.62	47.95	44.33	1226%
#3_P3	1.78	49.36	47.58	2672%
#3_P4	18.32	47.55	29.24	160%
#3_P6	0.80	42.14	41.34	5159%
#3_P7	58.83	73.00	14.17	24%
#3_P8	47.82	63.99	16.17	34%
#3_P11	47.37	76.69	29.32	62%
#3_P12	49.85	77.29	27.44	55%
#3_P13	54.19	106.04	51.85	96%
#3_P15	62.77	68.23	5.47	9%
#3_P16	77.71	65.57	-12.14	-16%

Foreground Luminance

item	Display	Sim	Difference	% Difference
#3_P1	481.00	223.43	-257.58	-54%
#3_P2	2016.00	342.77	-1673.24	-83%
#3_P3	1626.00	287.17	-1338.83	-82%
#3_P4	931.00	252.29	-678.71	-73%
#3_P6	2274.00	251.98	-2022.02	-89%
#3_P7	575.00	319.95	-255.05	-44%
#3_P8	420.00	249.24	-170.76	-41%
#3_P11	430.00	314.21	-115.79	-27%
#3_P12	391.00	308.46	-82.54	-21%
#3_P13	403.00	272.62	-130.38	-32%
#3_P15	541.00	312.71	-228.30	-42%
#3_P16	576.00	276.24	-299.76	-52%

Root Mean Square (RMS) error of Luminance between measurements and simulations



POTENTIAL SOURCE OF ERRORS

- Measurement geometry vs CAD geometry
- Measurement errors (equipment, eyepoint, alignment)
- Material optical properties
- Simulation errors
- Measured sky vs simulated sky

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MEASUREMENT

CIE Simulation



Natural sky
Simulation



SUMMARY

- Measurements & simulations
- Comparison
- Next steps...

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