Observer Metamerism and Wide Gamut Displays

NTNU Spectral Imaging Experts' Day

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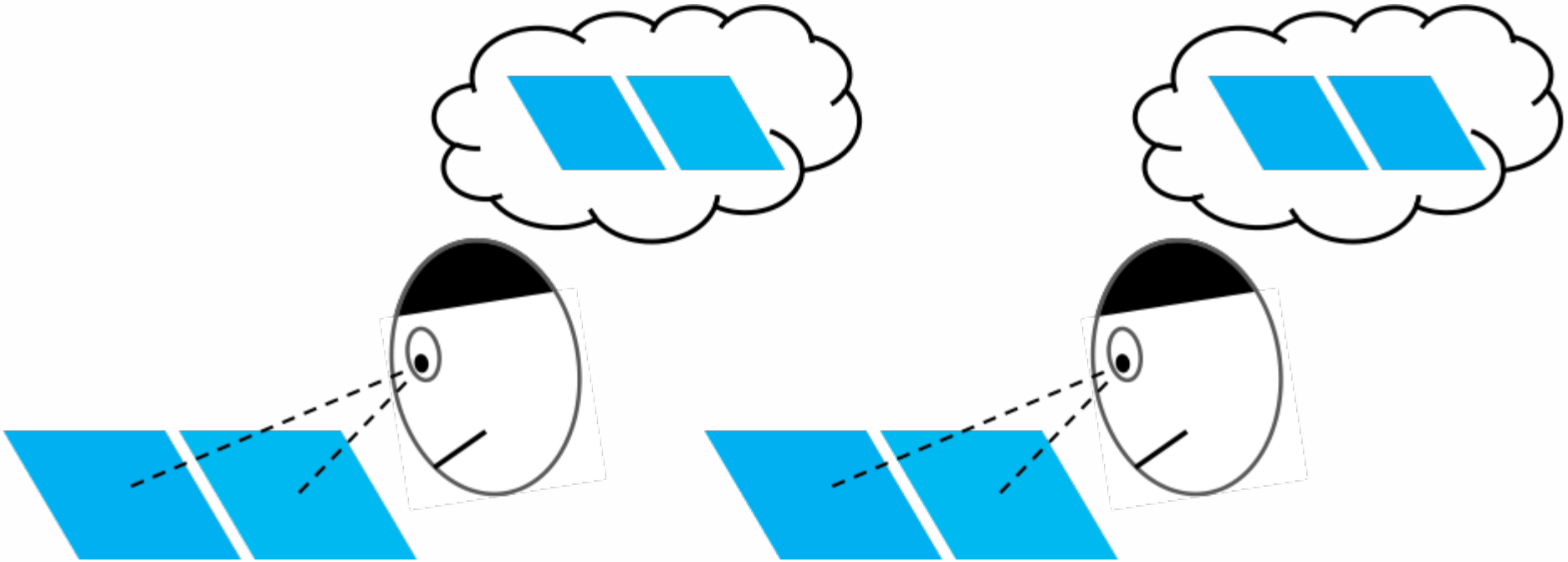
Agenda

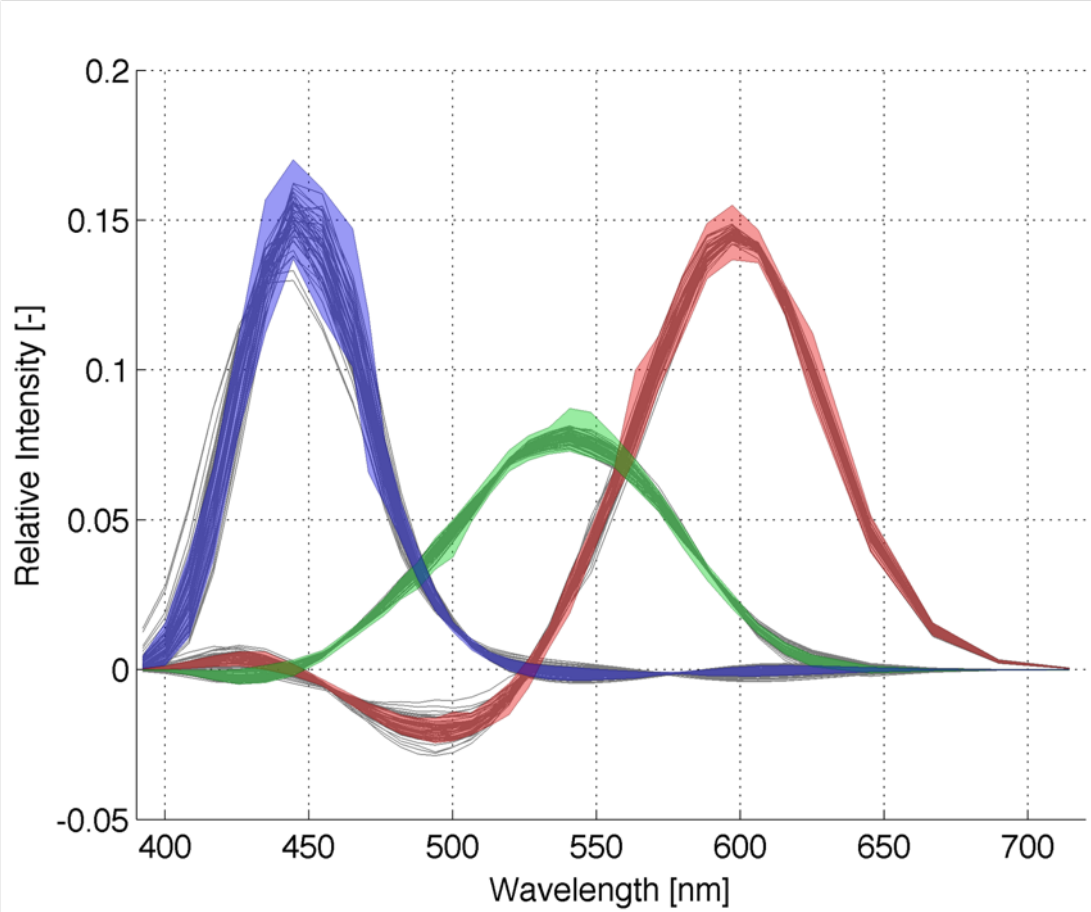
- **What is Observer Metamerism?**
- **Why It is Important for Wide Gamut Displays?**
- **Solutions?**
  - iccMAX
  - Current Implementation
- **What's next?**

What is Observer Metamerism?

- **The phenomenon by which two materials that match under one circumstance appear differently to different observers.**



Observer Variations

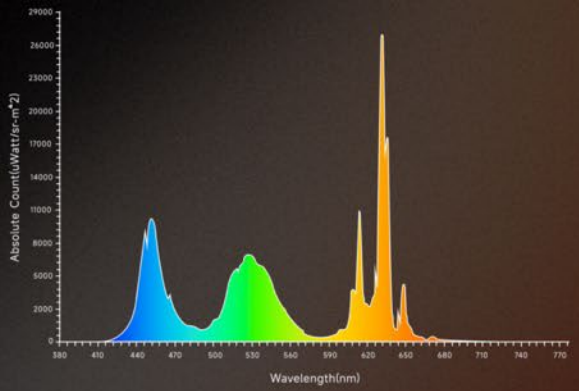


*Y. Asano, MSCL, RIT, USA http://www.cis.rit.edu/~yxa8513/Research.html

Why It is Important for Wide Gamut Displays?

Wide Gamut Monitors

X=95.1
Y=100.0
Z=108.9



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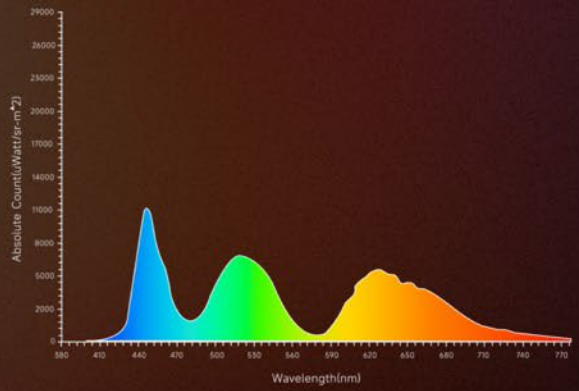

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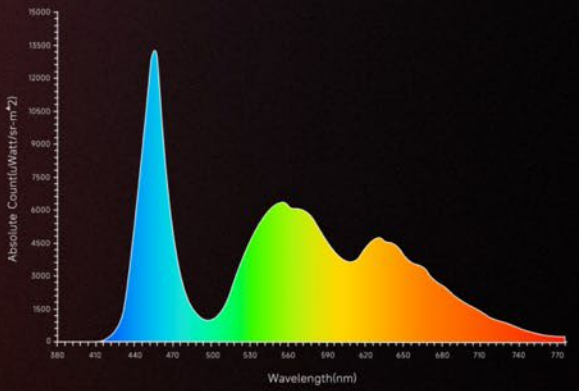
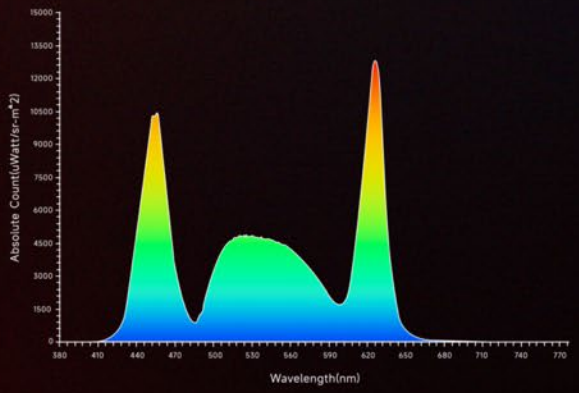
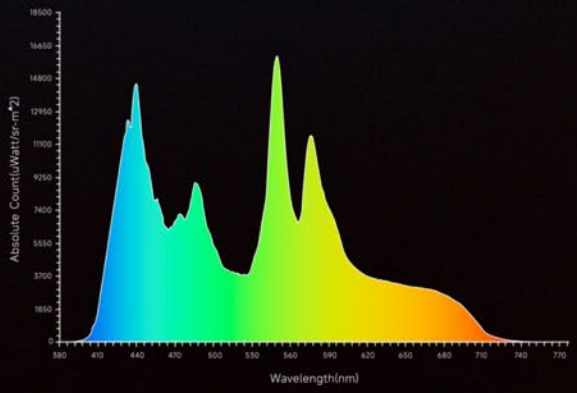


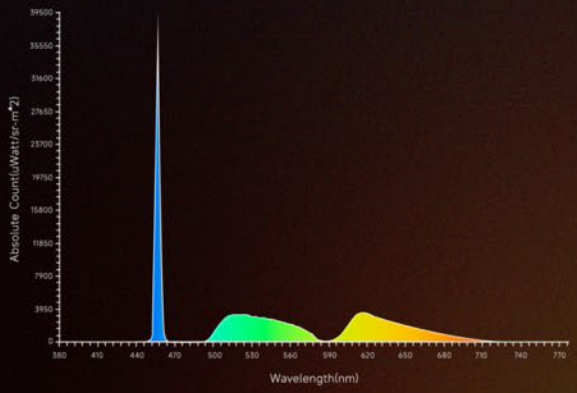
Why It is Important for Wide Gamut Displays?

Wide Gamut Projectors

X=95.1 Y=100.0 Z=108.9	X=95.1 Y=100.0 Z=108.9	X=95.1 Y=100.0 Z=108.9

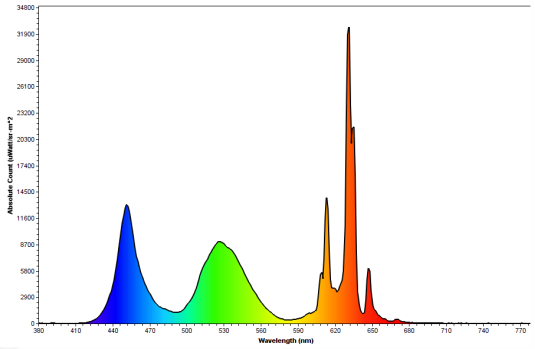




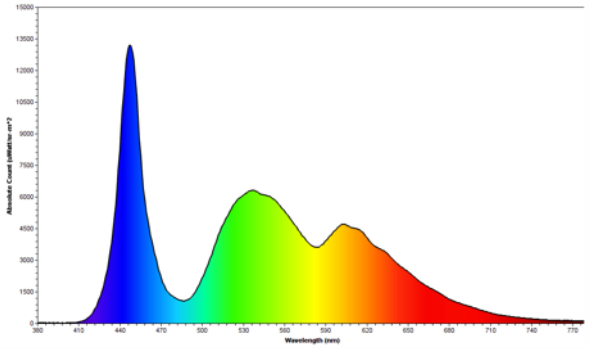


Solotion？

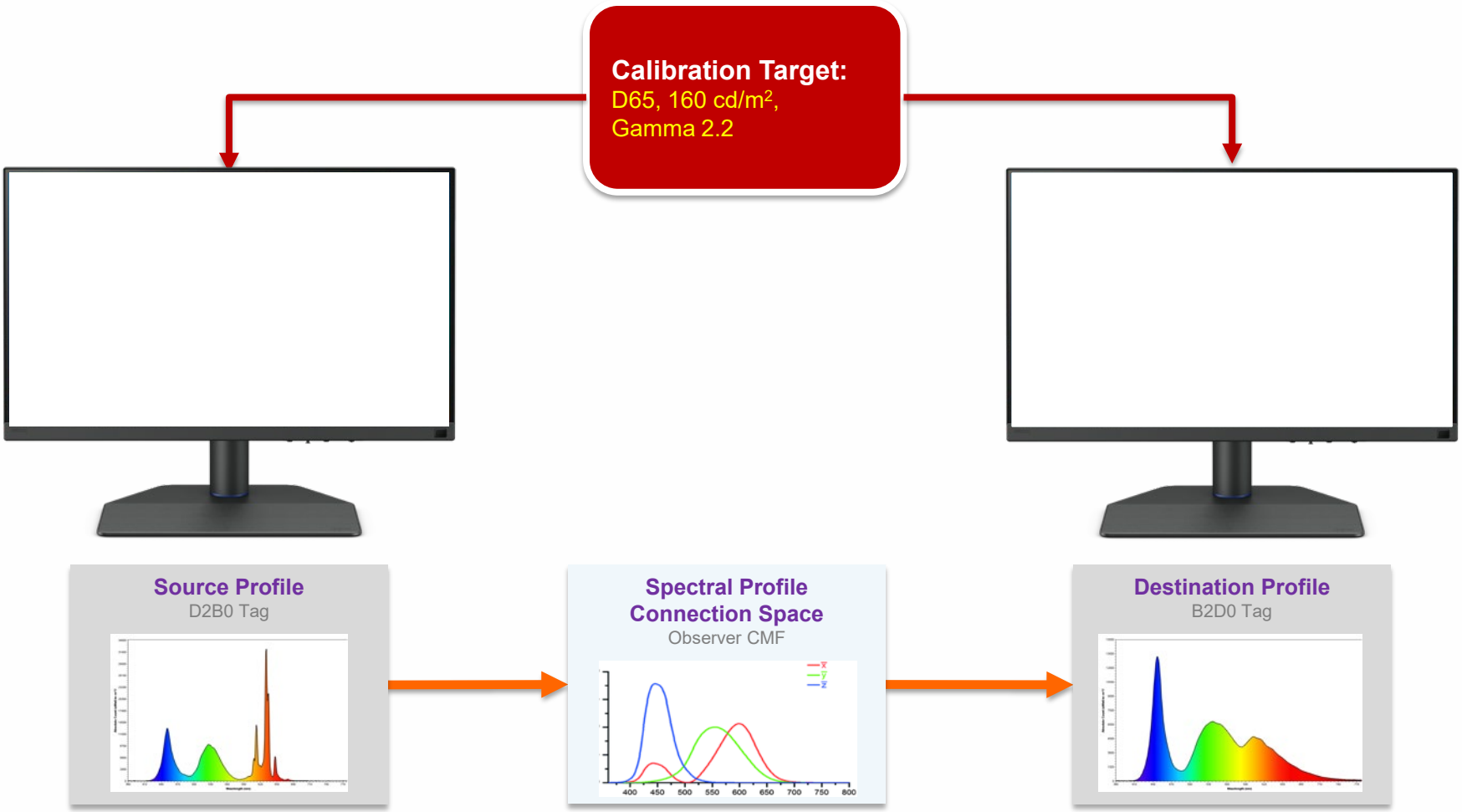
- **Use SPECTRAL Workflow!**



Transformation



Solution 1 - iccMAX



Solution 1 - iccMAX

What's preventing us doing so?

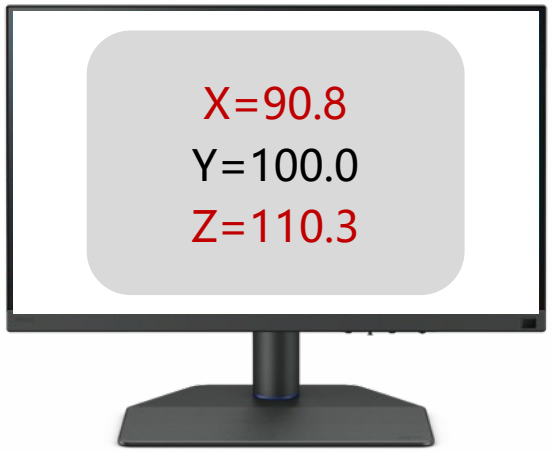
1. **Spectral measurement is expensive.**
   - Instrument is expensive
   - Measurement time is longer
2. **Lack of support for real world implementation of iccMAX.**
   - Need OS level support, or
   - Support from 3rd party software which has very large group of users.
3. **Difficult to determine or categorize individual CMFs.**
   - ICC is looking into methods to detemine or categorize indivudial CMFs.

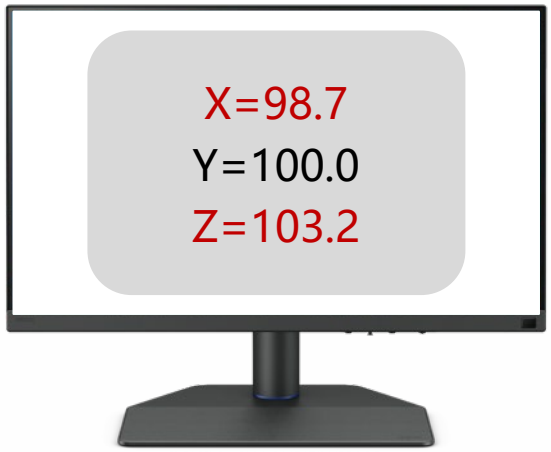
Solution 2 – Current Implementation

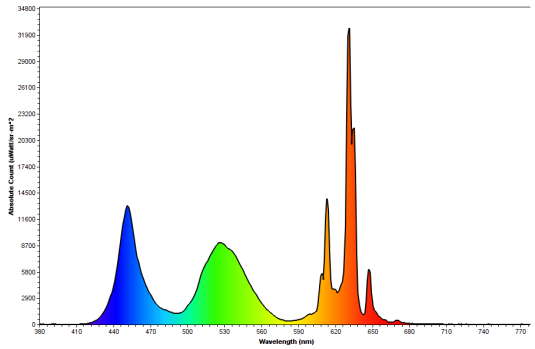
1. **To use tristimulus workflow rather than spectral workflow, i.e., using colorimeter instead of spectrophotometer:**
   - Need to correlate spectrophotometer / spectroradiometer reading to colorimeter.

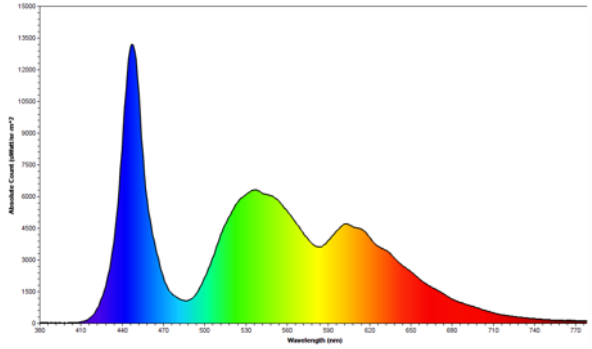
Solution 2 – Current Implementation

- Need to define different targets according to different light source.

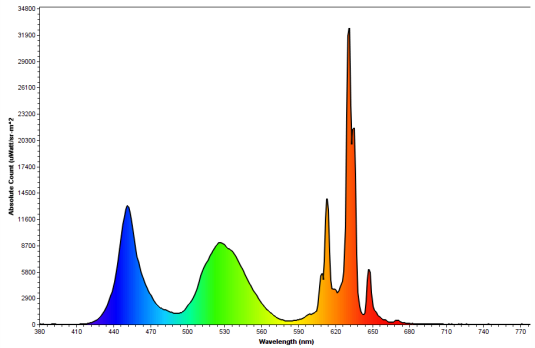


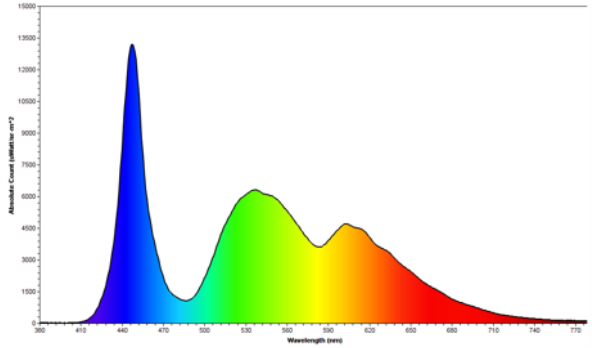






Solution 2 – Current Implementation





Solution 2 – Current Implementation

Solution 2 – Current Implementation

- **Although this seems to work, but the process is tedious!**
  - Understand the differences in light sources.
  - How to adjust the target according to different observers?
  - The transformation is done one-to-one basis.
  - It is all done by experience, difficult to induce to a generialized workflow.
  - …

What's Next?

- **iccMAX provides the means to reduce the effect of observer metamerism.**
  - Need implementation!
- **ICC is looking for ways to detemine or categorize indivudial CMFs.**
  - The discussion is held in Displays Working Group (DWG).
  - Call of Proposal was also sent out for this years's Danny Rich's Memorial Research Fund.

Thank You for Your Attention!

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