INTERNATIONAL COLOR CONSORTIUM

Connecting Color Science and Color Engineering using iccMAX

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What is Color?

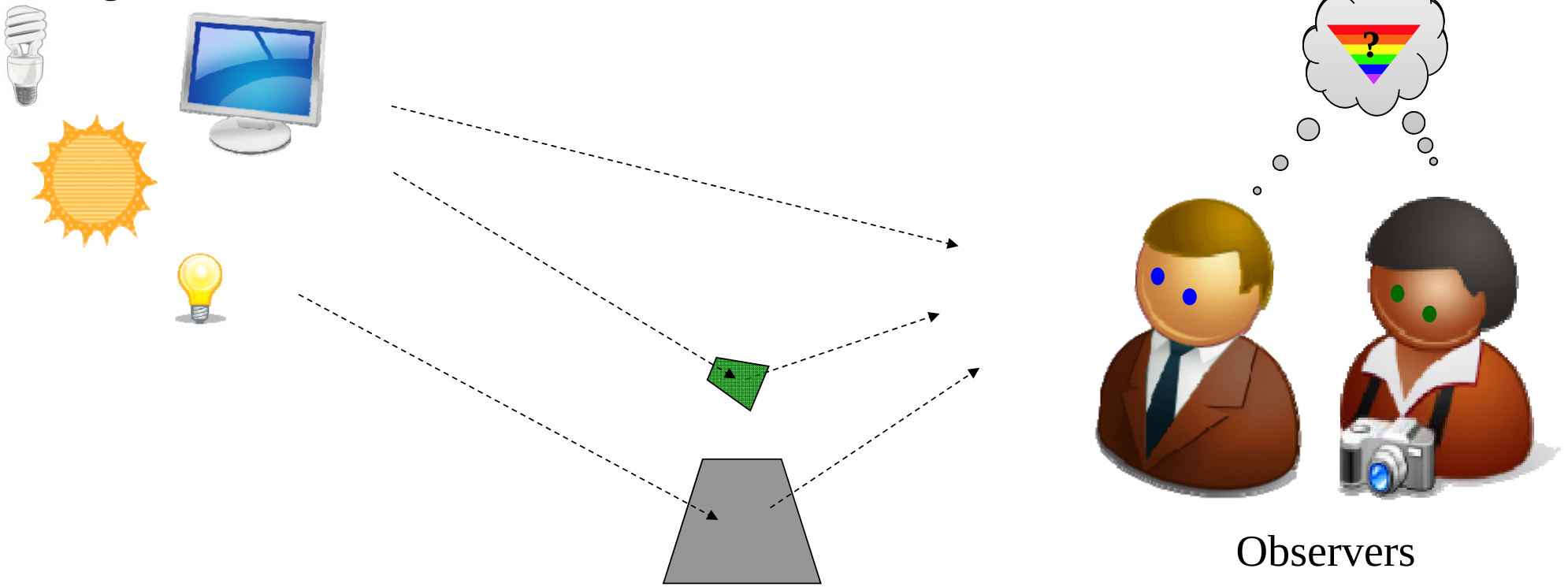
- **Color is a way that we describe an object based on the way that it reflects or emits light**
- **Your eye can see different colors because a part of your eye called the retina is sensitive to different wavelengths of light**

https://www.mensaforkids.org/teach/lesson-plans/introduction-to-color/

The Elements of Color

Perception
(Processing)

Light Sources



Observers

Objects

Color Science

The study and quantification of light, its interactions, and its perception

This involves:

- Physics
- Chemistry
- Biochemistry
- Vision Science
- Neural Science
- Material Science
- Psychophysics
- Psychology
- …

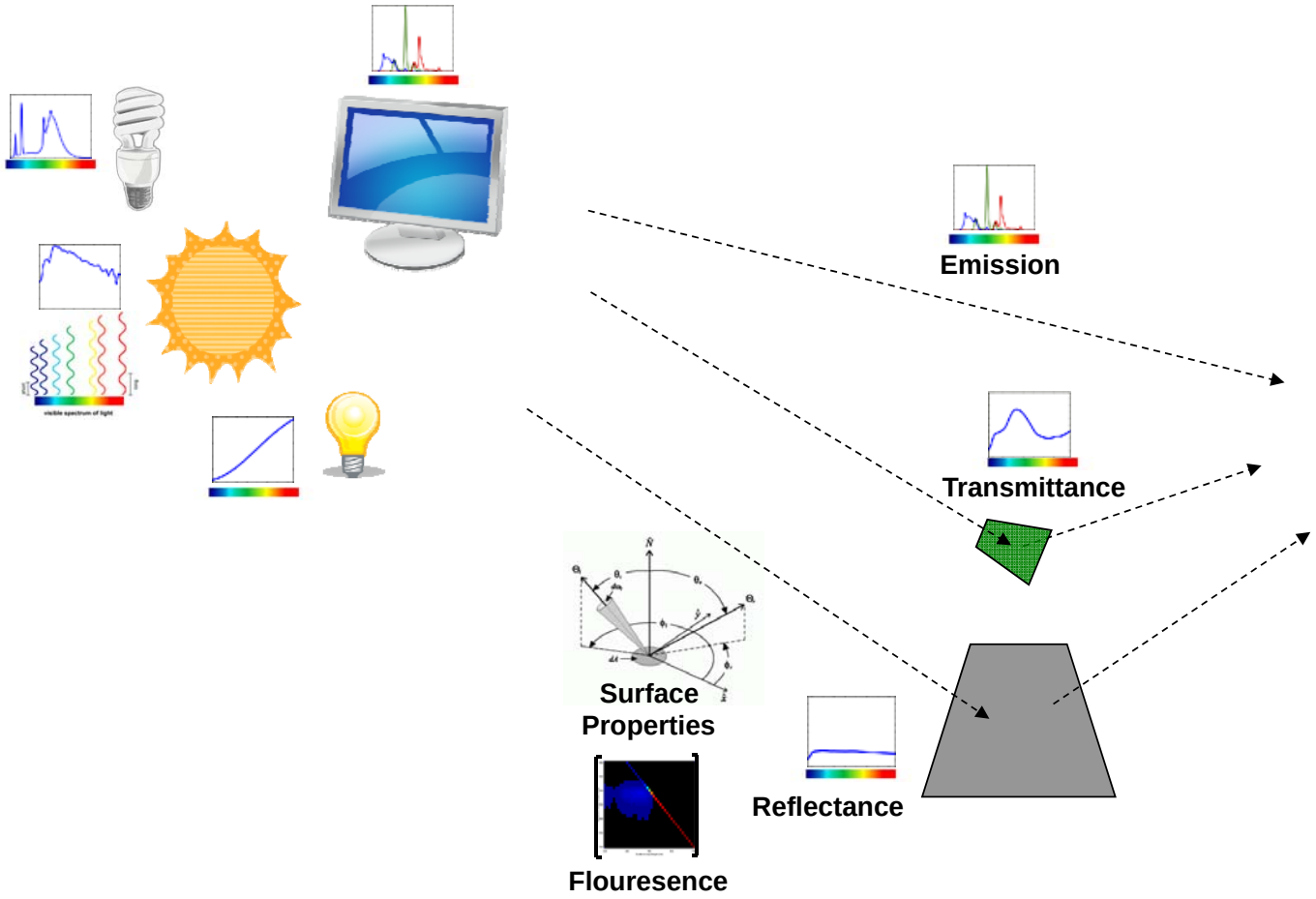
Color Engineering

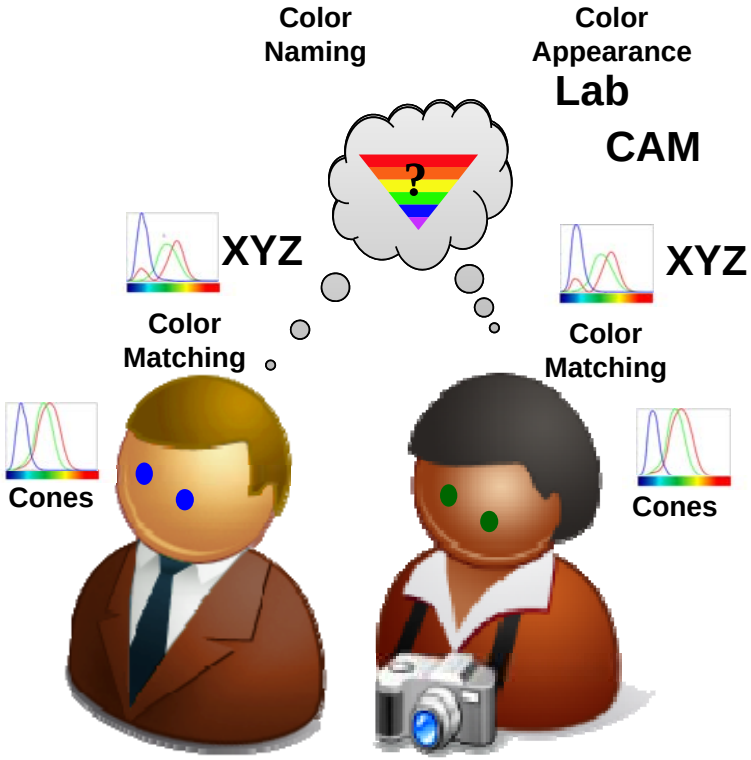
The design and implementation of systems that create, manipulate or capture light

This involves:

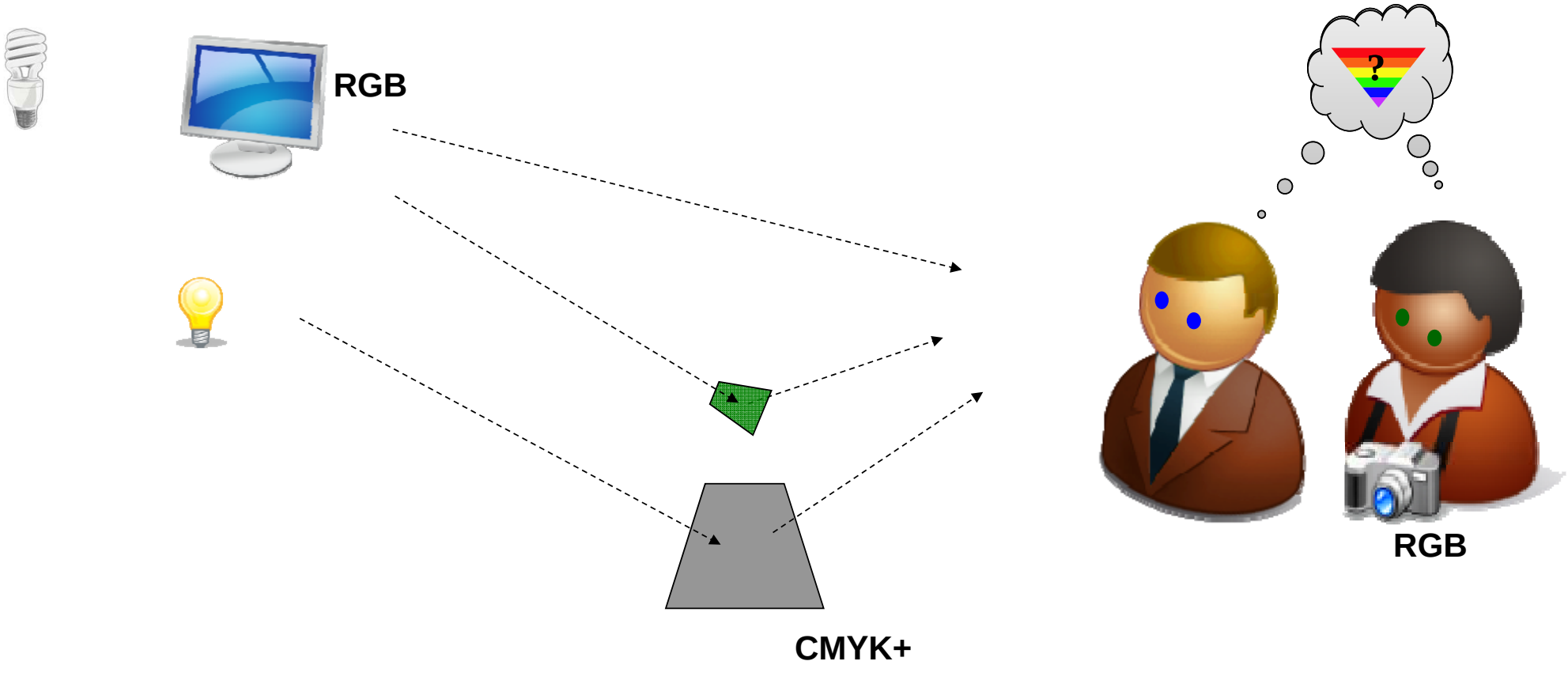
- Colorant formulation
- Printing
- Filter and sensor design
- Lighting design
- Chemical Engineering
- Hardware and Software
- Mechanical and Electrical Engineering
- **...**

Quantification of Light and Perception

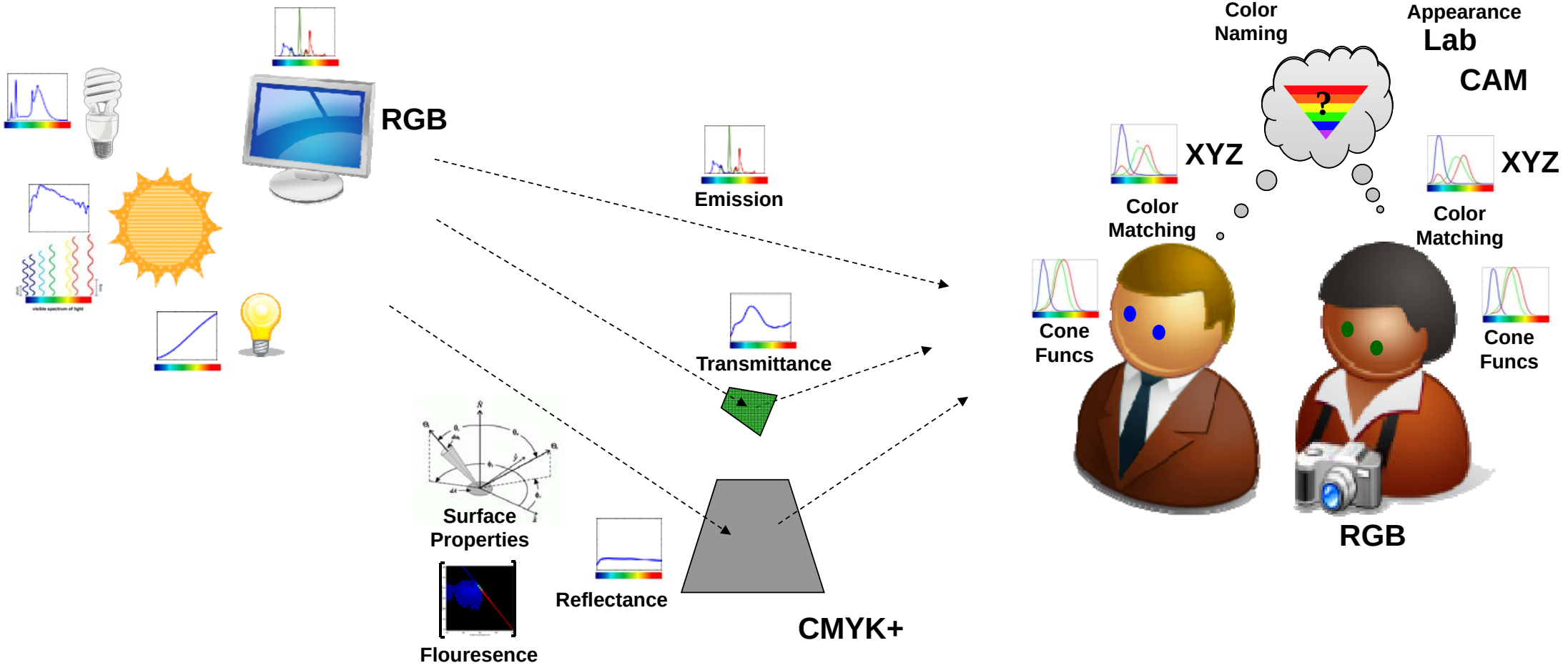




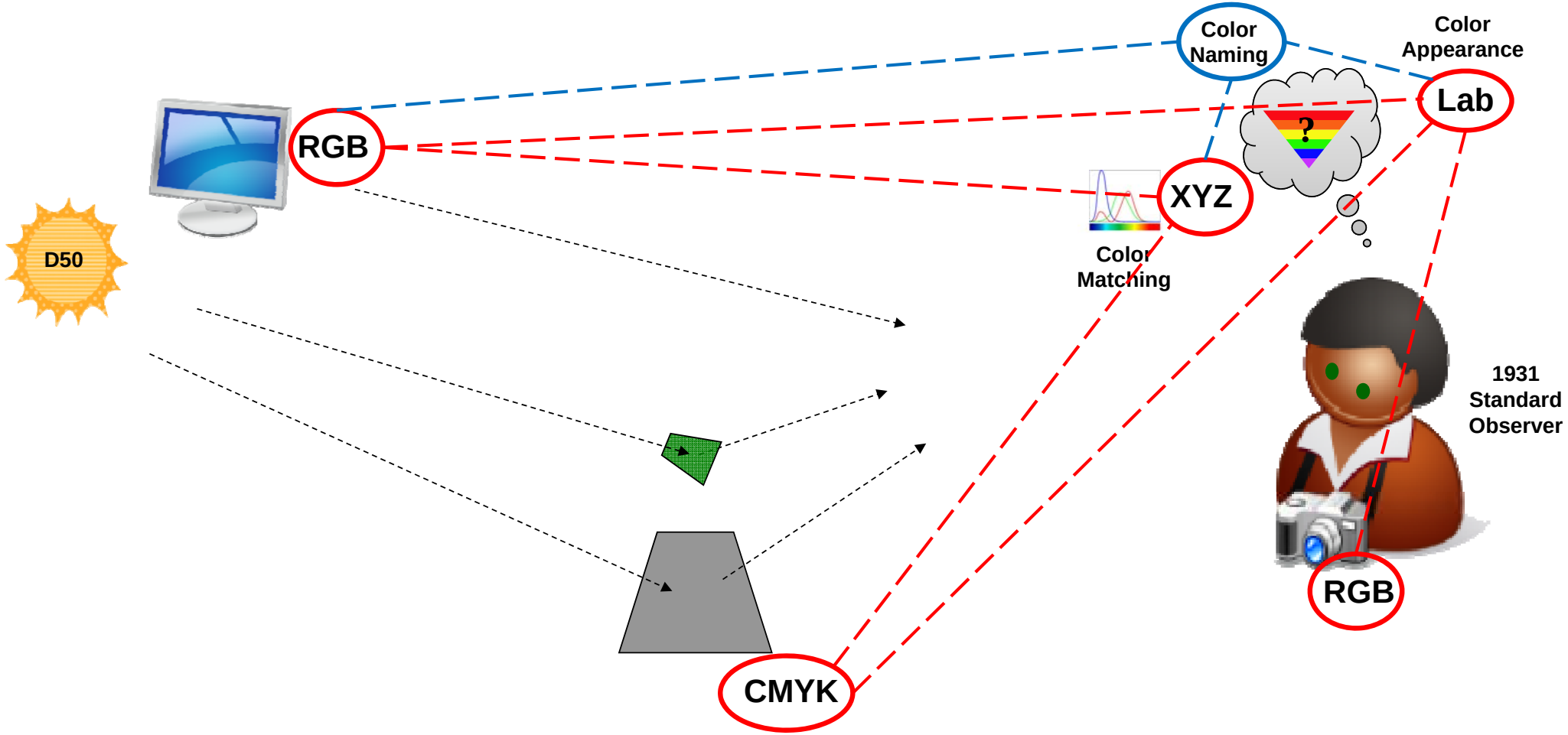
Creating, Manipulating, and Capturing Light



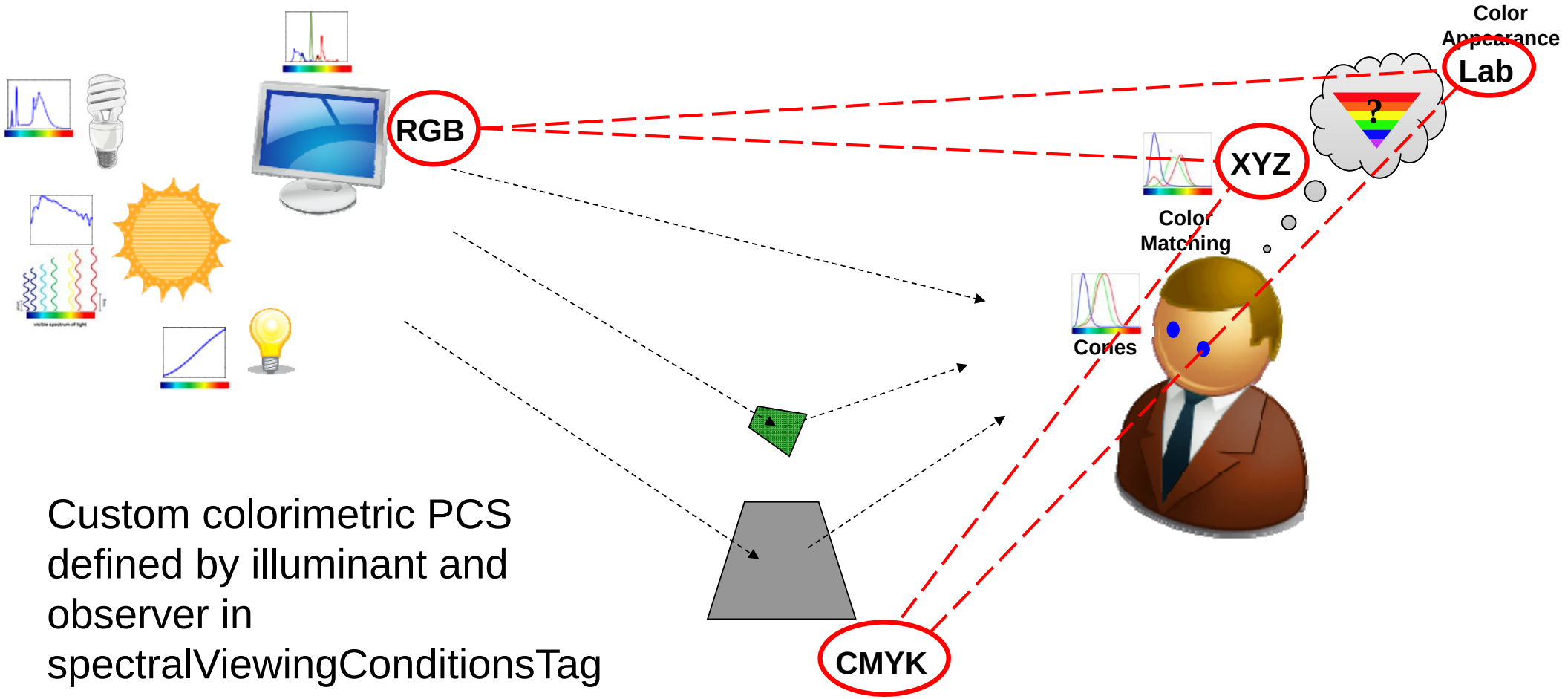
Color Management Connects Science and Engineering



ICC.1 Connections



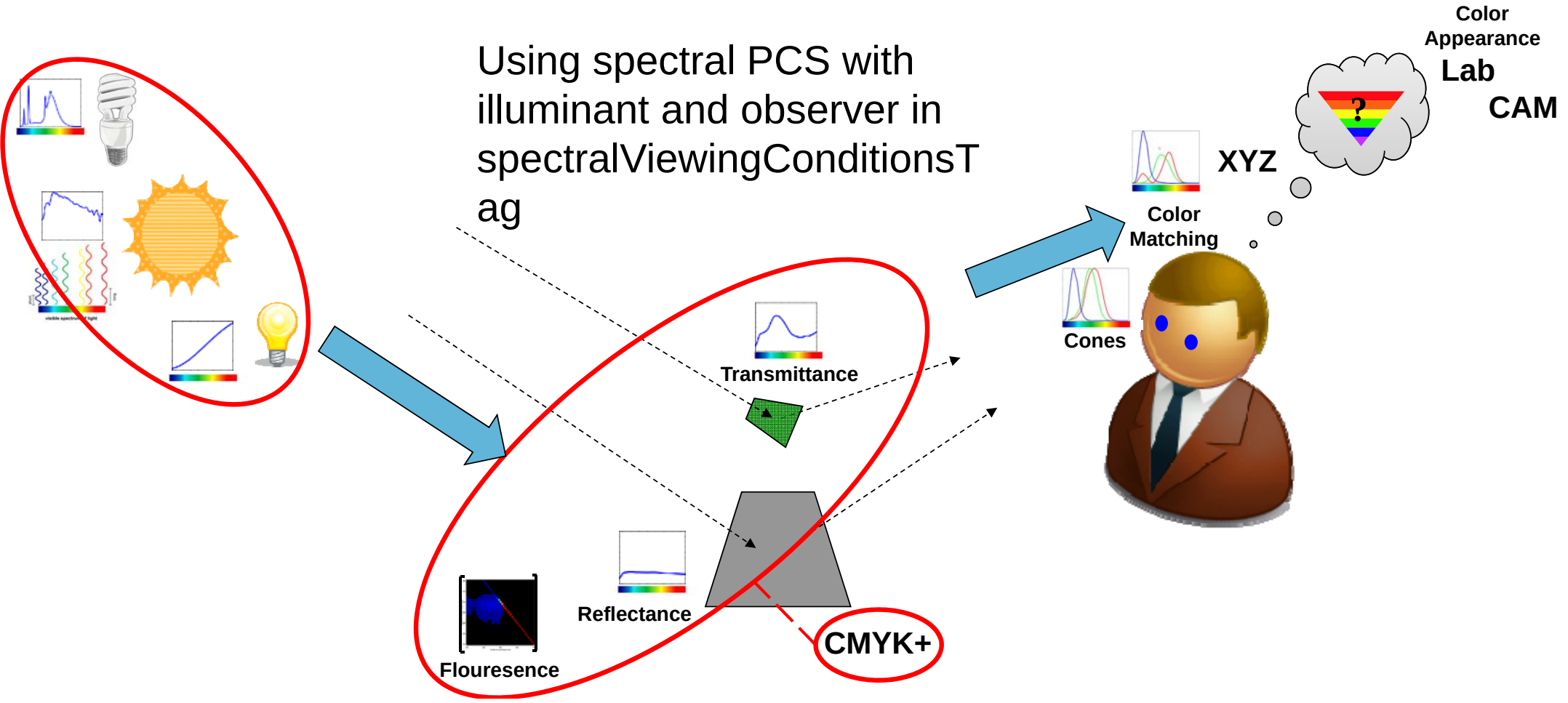
iccMAX: Custom Colorimetric connections



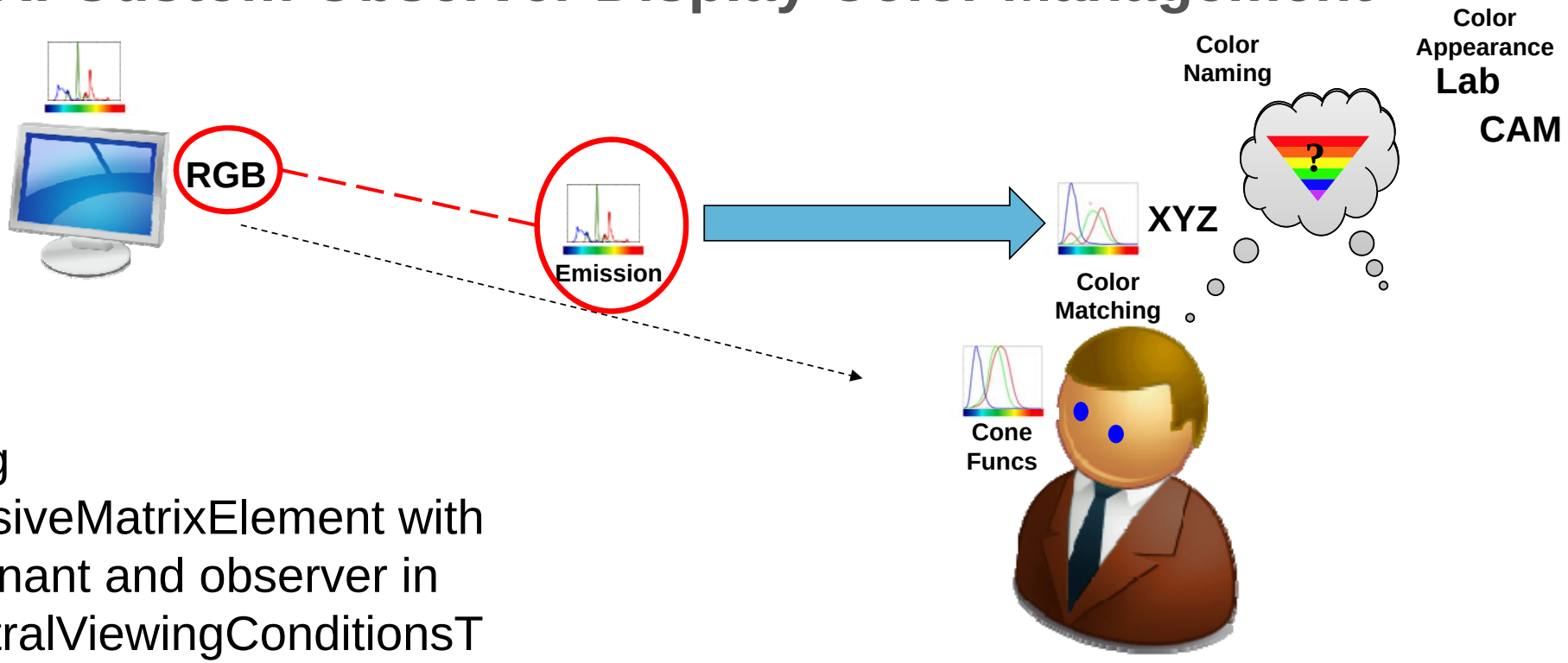
Custom colorimetric PCS defined by illuminant and observer in spectralViewingConditionsTag

iccMAX: Spectrally-based Object Connections

Using spectral PCS with illuminant and observer in spectralViewingConditionsTag

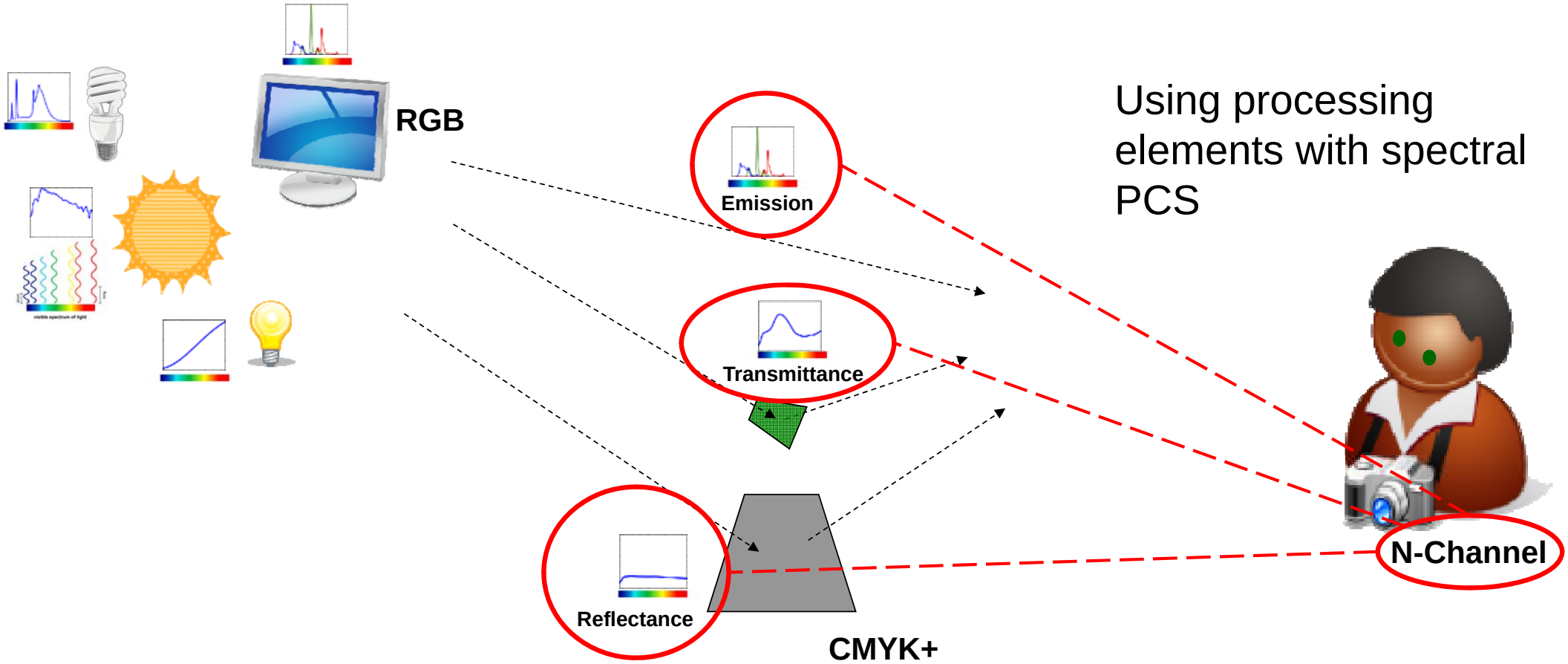


iccMAX: Custom Observer Display Color Management



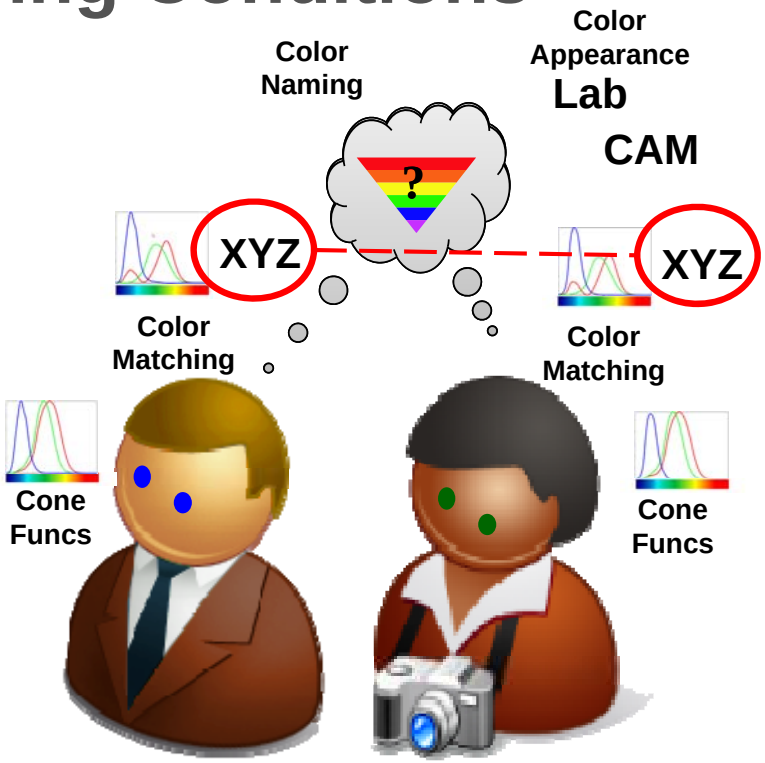
Using emissiveMatrixElement with illuminant and observer in spectralViewingConditionsTag

iccMAX: Spectral Image Capture

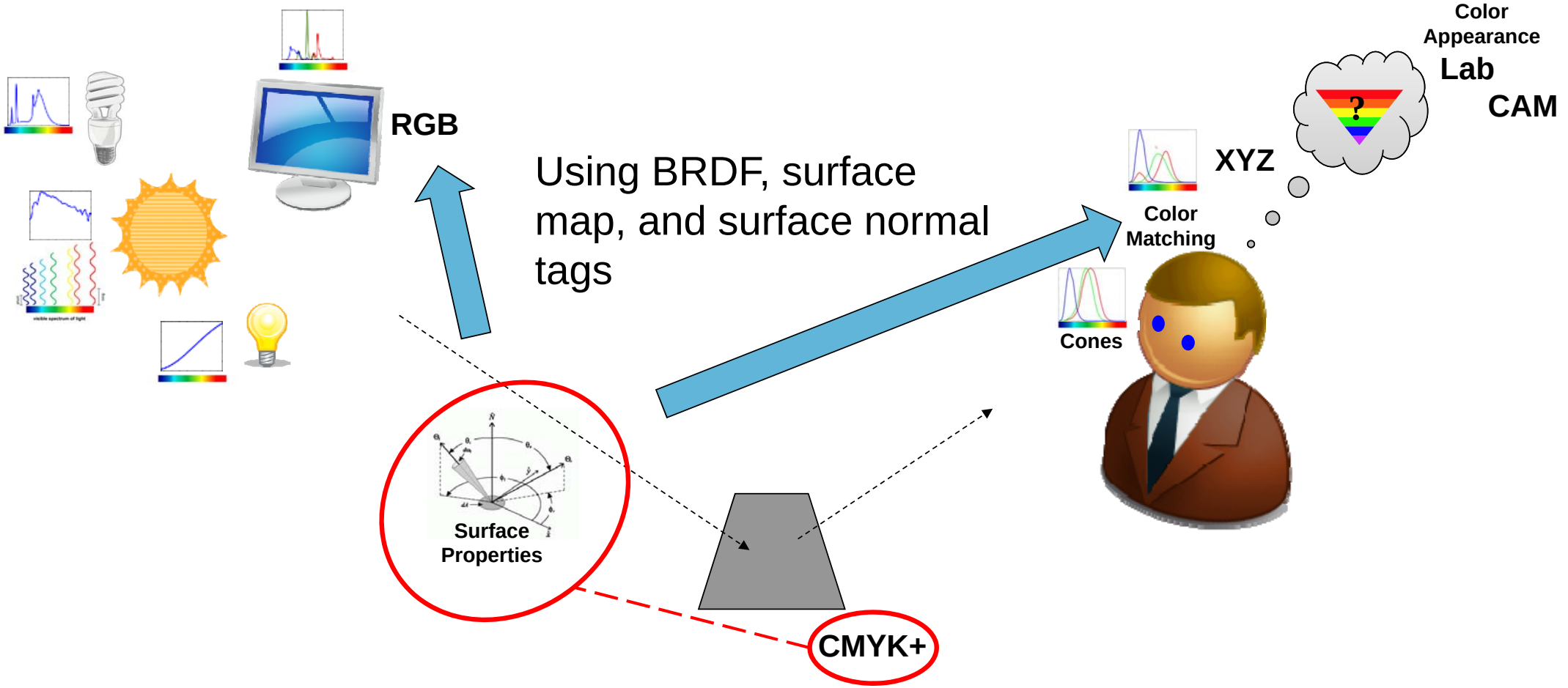


iccMAX: Connecting Between Observing Conditions

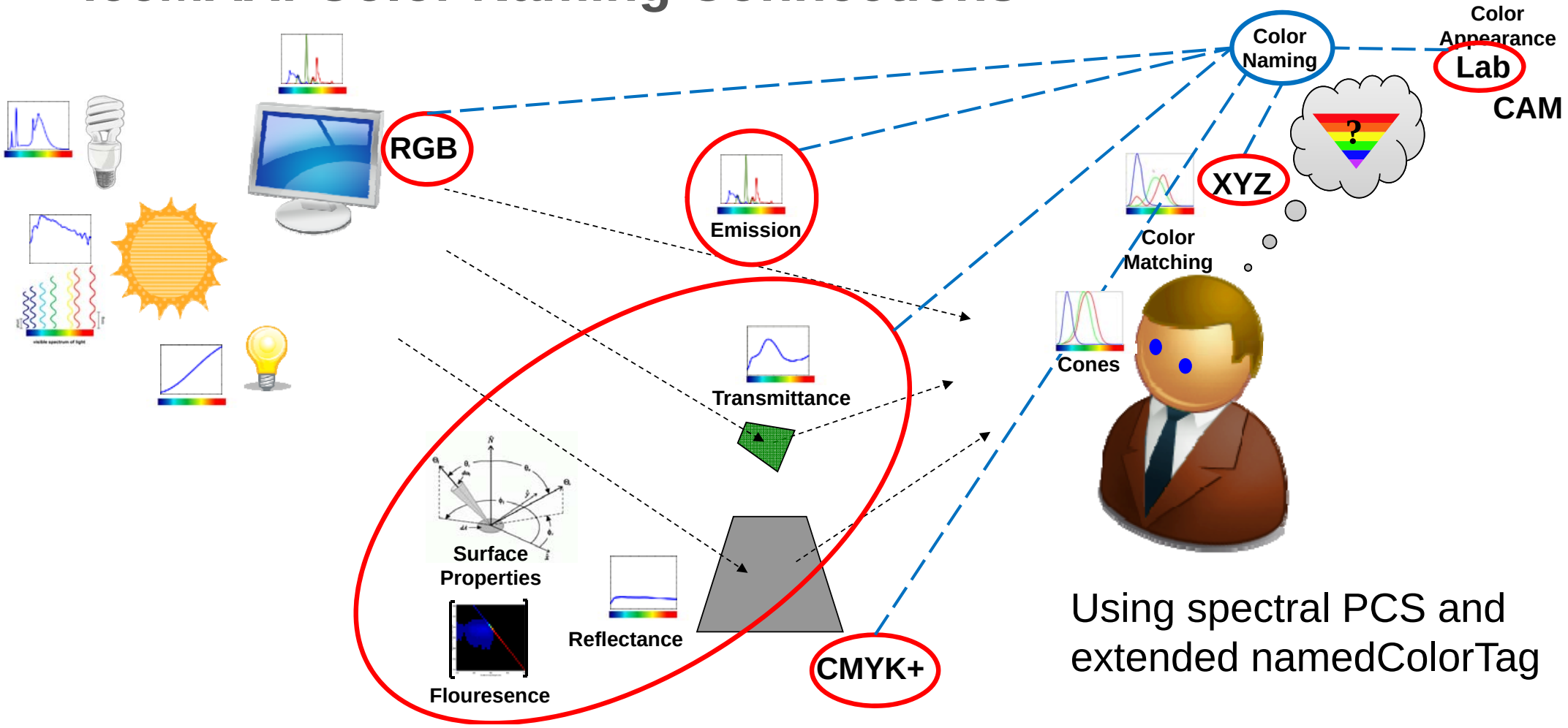
The customToStandardPccTag and standardToCustomPccTag are used as part of PCS processing to convert colorimetry between different observers and/or illuminants



iccMAX: Surface Properties Connections

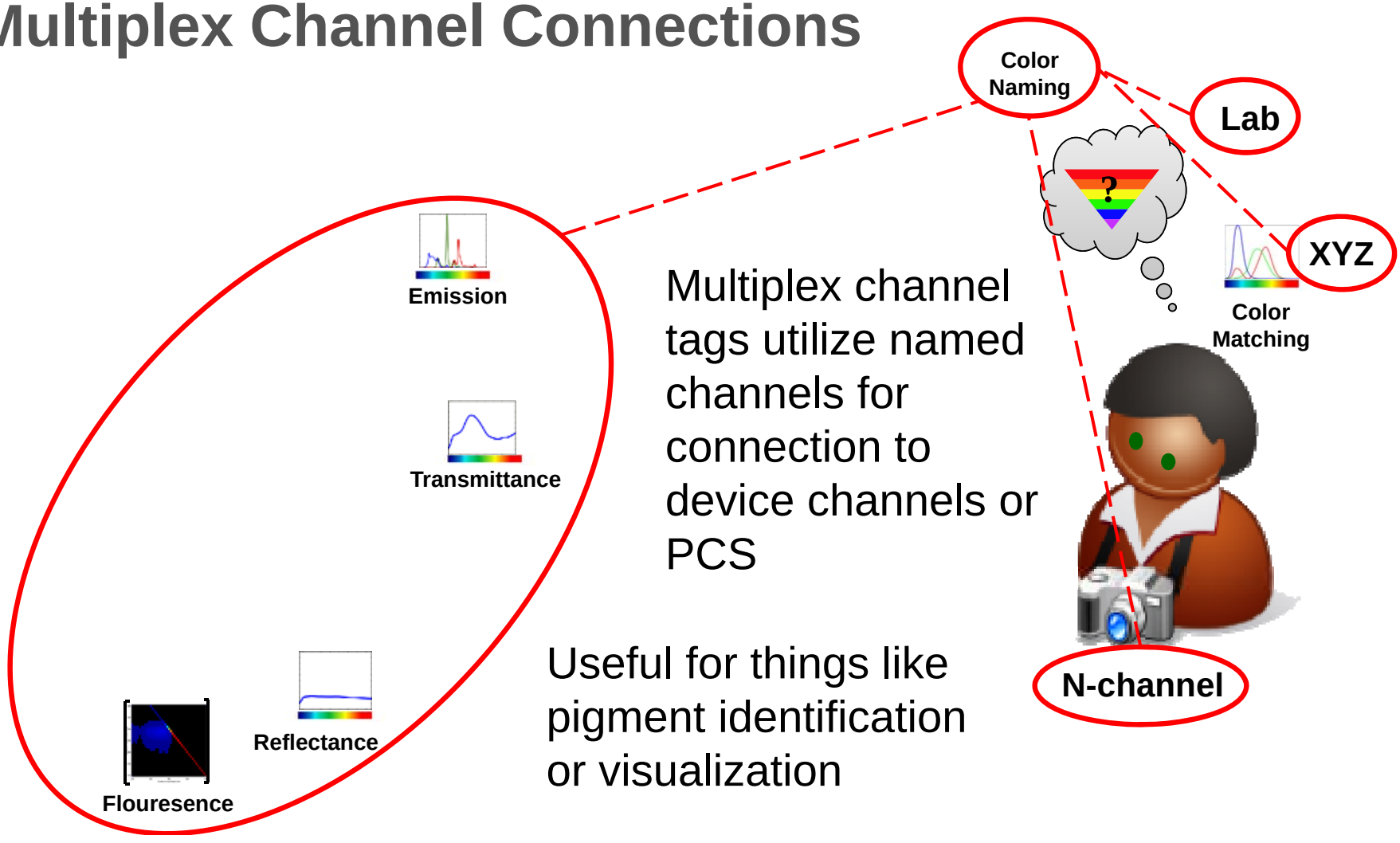


iccMAX: Color Naming Connections



Using spectral PCS and extended namedColorTag

iccMAX: Multiplex Channel Connections



Multiplex channel tags utilize named channels for connection to device channels or PCS

Useful for things like pigment identification or visualization

Conclusions

iccMAX is About Color in the Real World

- **iccMAX enables various connections between Color Science and Color Engineering**
- **iccMAX provides a platform with both flexibility as well as extensibility for modeling and defining color workflows**
- **Many of the complexities of color in the Real World are encompassed by iccMAX**

Reference Material

- **ICC web page**
  - http://www.color.org
- **iccMAX web page:**
  - http://www.iccmax.org
- **ICC specification documents:**
  - http://www.color.org/icc_specs2.xalter
- **iccMAX demonstration implementation:**
  - https://github.com/InternationalColorConsortium/DemoIccMAX
- **Max Derhak's PhD dissertation**
  - Spectrally Based Material Color Equivalency: Modeling and Manipulation
  - http://scholarworks.rit.edu/theses/8789/

Thank You

Questions?