



## STEM Day Lesson Plan

### **Lesson Plan Author(s) Names and Affiliation:**

Judith A. Moldenhauer, Professor of Art (Graphic Design), Department of Art and Art History (College of Fine, Performing and Communications Arts)

**Title:** Telling Science Stories: Using Graphic Design to Make Ideas Visible

**Subject Area:** Graphic Design / Information Design

**Learning Activity Description:** A short presentation for all students discussing the relationship between what you want to communicate and how to visualize that information. Students in groups of five (5) are given a write-up about the solar system and asked to determine the one idea they want to communicate from that reading (putting it into a sentence of 25 words or less) and then asked to generate sketches to effectively visually represent that idea. Students will post their resulting sketches and discuss why the sketches look the way they do.

**Lesson Activity Objective:** To have students realize the importance of being clear about what they want to communicate in a scientific diagram and to be aware of how their choices of type, pictures, colors, size, shape, arrangement, etc. affect the ability to tell the stories of that idea effectively.

**Lesson Activity Outcomes:** Students will be able to identify what they want to communicate in a scientific diagram and create diagrams that effectively tell the story of scientific concepts or data through visual signaling (line, shape, color, placement, etc.) so that the words and pictures in the diagram can best express the concept or data set.

**Materials/Supplies Listed:** laptop and projector for presentation; 18"x24" Post-it Note pads (at least one) or big sheets of newsprint or butcher paper; non-permanent markers (broad or medium-tipped); a roll of painter's tape (adhesive won't stick to wall surfaces) to help with posting the sketches at the end of the session.

### **Teacher Procedures:**

1. Prepare presentation (in PDF format if possible) that shows different ways to visualize a concept through 2-5 diagrams (e.g., the water cycle). In the presentation discuss what each diagram is specifically communicating (e.g., the cloud formation, the landscape, the evaporation process), how it does that visually (e.g., more space for images that represent clouds, the use of arrows and their size and color), and evaluate how well the diagram communicates (do some of the visual choices get in the way? What could be done differently?).
2. Students are assigned to groups of 3-5 and given a sheet that contains a wide range of information about a scientific idea concept or entity (e.g., solar system) and asked to

communicate on one aspect of the information through sketches for a diagram. This way, students can have a large range of things from which they can select one to communicate through the diagram.

3. Students are given the handout that recaps the points in the presentation and provides examples of visual organization systems that the students could use to organize the elements they want to include in their sketches.
4. Each group is given at least 18"x24" Post-It note sheet; the paper can be used horizontally or vertically; the paper can lie flat on a table or be attached to a wall. Each student is given a non-permanent marker. They will do their brainstorming and sketching on this sheet (more as needed). Each group should produce at least 3 different sketches that could communicate their concept/data.
5. At the end of the workshop session, each group will post their sketches on a wall and present their work to the class, stating in one sentence what they wanted to communicate, then describing their visual choices for the elements in the sketches, and then evaluating the sketches (what worked, what didn't work, and what could be improved).

**Preparation Time for Learning Activity:** 1-3 hours to prepare the presentation (including online research and use of software to create the presentation and photocopying of handout). 15 minutes to hook up the laptop/projector and position the Post-It Notes and markers.

**Room set-up:** Wall space and tables for groups to work and post their work.

**Group Strategies (example, group size, expected time for groups, etc.):** Students should work in groups of 3-5.

**Student Products/Artifacts/work pages:** See attached PDF of handout. Sample presentation attached (PDF format).

**Assessment Criteria/Rubric:** Groups present work at the end of the session; discussion of what worked and what didn't work and what could be improved. Whole class responds to the work after the presentation by each group.

**Closing/Transition to next activity:** It would be great to post the sketches in a hallway or exhibition space to be shared with others outside of the class.

The solar system is the gravitationally bound planetary system of the Sun and the objects that orbit it, either directly or indirectly. Of the objects that orbit the Sun directly, the largest are the eight planets (Venus, Mercury, Earth, Mars, Jupiter, Saturn, and Uranus) with the remainder being smaller objects, such as the five dwarf planets (Ceres, Pluto, Haumea, Makemake, and Eris) and small solar system bodies (comets and asteroids). Natural satellites (or moons) orbit the Sun indirectly by orbiting some planets and dwarf planets: Earth has one moon, Mars has two, Jupiter has sixty-two, Uranus has 27; Pluto has five, Haumea has two, Makemake has one, and Eris has one.

The vast majority of the system's mass is in the Sun, with the majority of the remaining mass contained in Jupiter. The four smaller inner planets, Mercury, Venus, Earth and Mars, are terrestrial planets, being primarily composed of rock and metal. The four outer planets are giant planets, being substantially more massive than the terrestrials. The two largest, Jupiter and Saturn, are gas giants, being composed mainly of hydrogen and helium; the two outermost planets, Uranus and Neptune, are ice giants, being composed mostly of substances with relatively high melting points compared with hydrogen and helium, called volatiles, such as water, ammonia and methane. All eight planets have almost circular orbits that lie within a nearly flat disc called the ecliptic.

The solar system also contains the asteroid belt, which lies between the orbits of Mars and Jupiter, mostly contains objects composed of rock and metal. Beyond Neptune's orbit lie the trans-Neptunian objects (objects beyond Neptune that orbit the sun) that include the dwarf planets and the Kuiper belt (icy rocks). In addition, various other small-body populations, including comets, centaurs (minor planets) and interplanetary dust clouds, freely travel between regions.

The solar system is located in the Orion Arm of the Milky Way galaxy. Its other three arms are: Perseus, Centaurus, Sagittarius, and Carina.

[source: Wikipedia]

What do you want me to know?

Graphic designers use **visual signalling** to show **relationships** between ideas and data through typography and images.

Visual signaling reveals the **hierarchy of information** – what you want me to see first, second, third, etc.

### **Visual signals/variables**

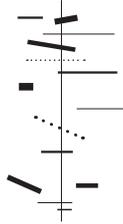
- Size
- Weight
- Shape
- Spacing
- Color
- Placement

Change the signaling and you change

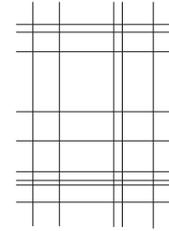
- the visual relationships
- the hierarchy
- the meaning of the information.

## Systems of Visual Organization

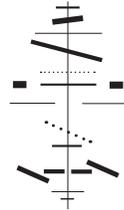
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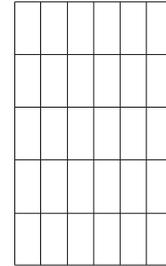
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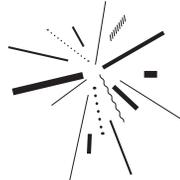
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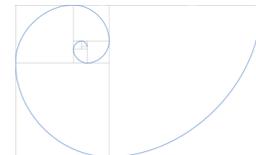
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- Radial



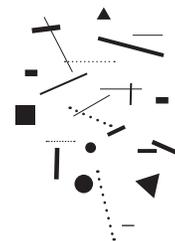
- Golden Rectangle



- Translateral

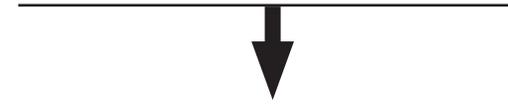


- Random





What Do You  
Want Me  
to Know?



# **Telling Science Stories** Using Graphic Design to Make Ideas Visible

**Judith A. Moldenhauer**

Professor of Art

Graphic Design

Department of Art and Art History

*March 12, 2019*



## Visual storytelling / Graphic Design

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**Graphic designers tell stories through the arrangement words and pictures.**

**These arrangements or **visual relationships** between things create meaning and give shape to the story of that you want me to understand.**

**What do you want me to **understand**?**

**What is the take away?**



## Visual Storytelling / Hierarchy of Information

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How the words and pictures look produces a **visual hierarchy** that tells me what you want me to understand first, second, third, etc.

Your visual choices **signal** the hierarchy.

The signals you choose will define **what you want me to know.**



# Visual Storytelling / Visual Signaling

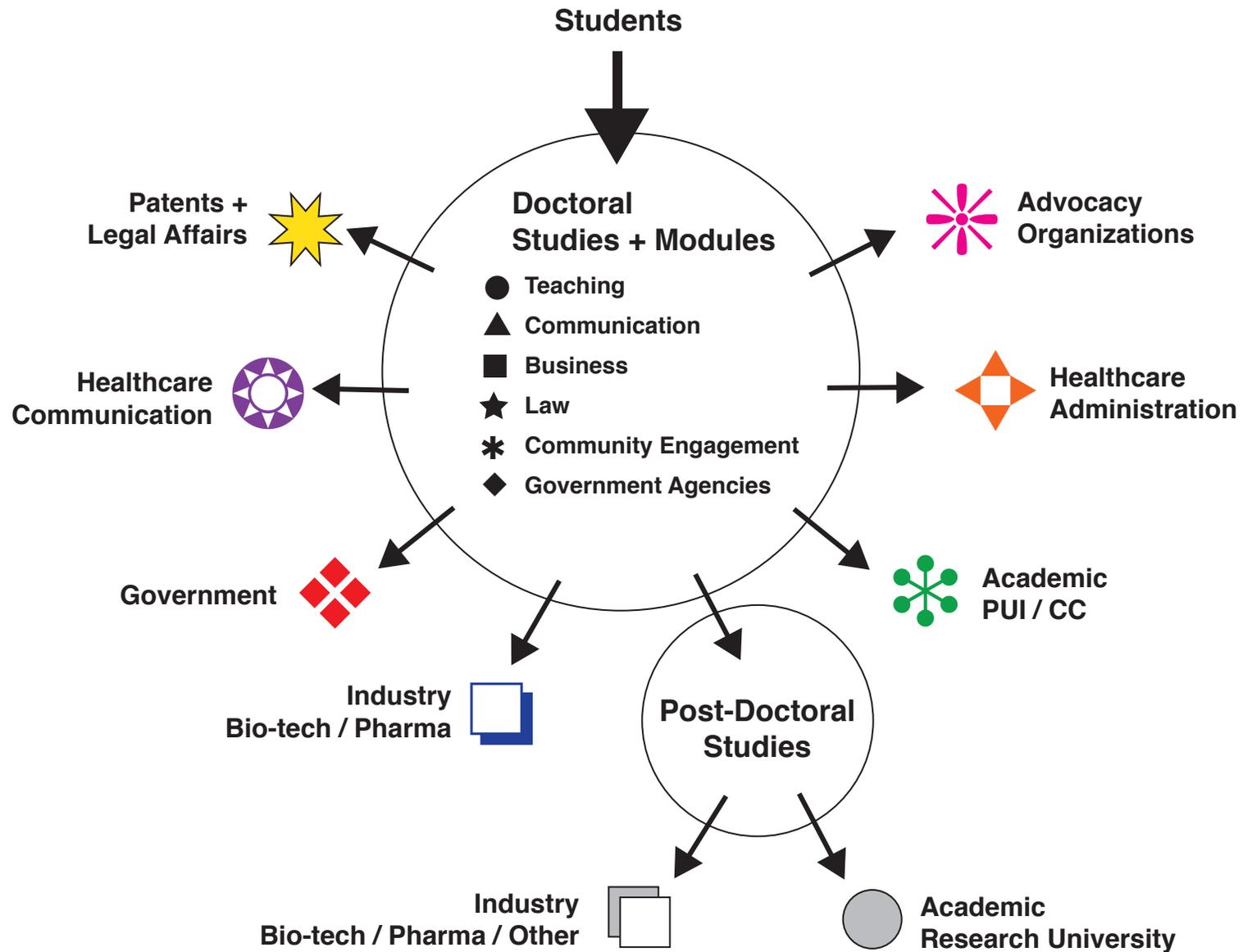
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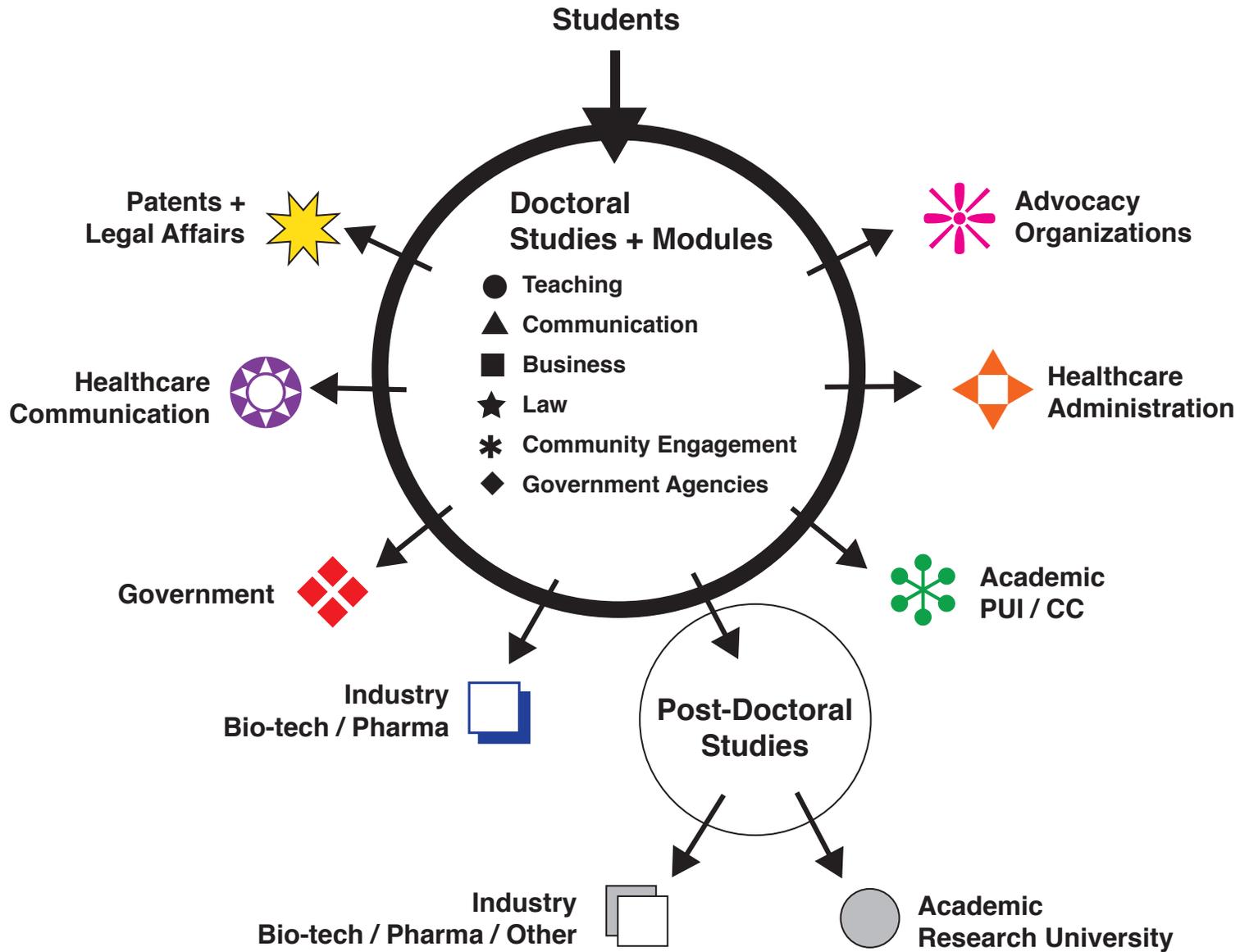
**Visual signaling** includes

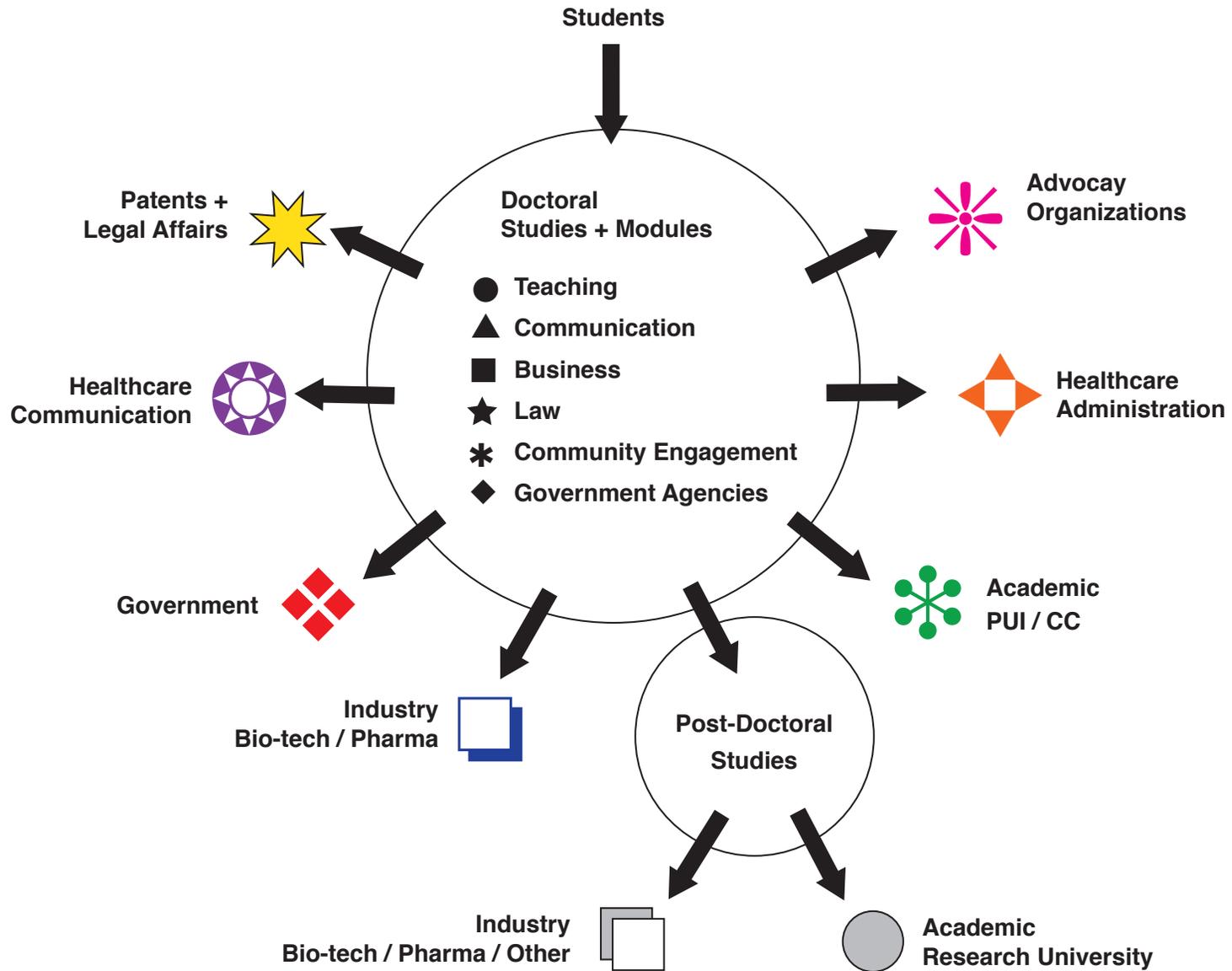
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- Placement

**Change the signaling and you change**

- the visual relationships
- the hierarchy
- the meaning of the information









## **Visual storytelling / [example]**

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## Visual Storytelling / Visualizing Ideas

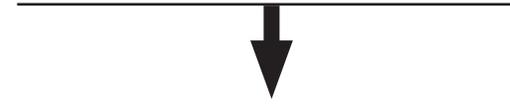
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**Using what you have learned today about visual storytelling ...**

- **Read the text about the solar system.**  
**What is the **most important thing** you want me to know about the solar system? (your story)**
- **Now use your knowledge of visual signaling and visual hierarchy to **draw** what you want me to know. You can use any combination of words and images.**  
**How do your visual choices (size, shape, etc.) make sure I understand your story?**



What Do You  
Want Me  
to Know?



# **Telling Science Stories** Using Graphic Design to Make Ideas Visible

**Thank you!**

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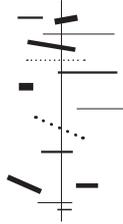
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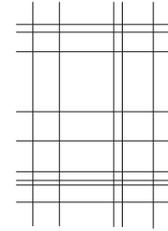
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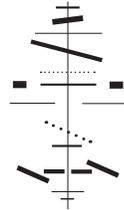
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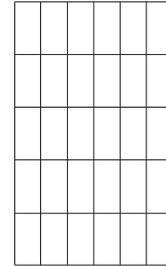
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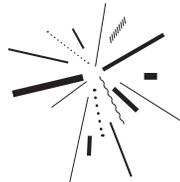
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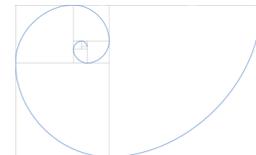
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