

Getting the Message Out

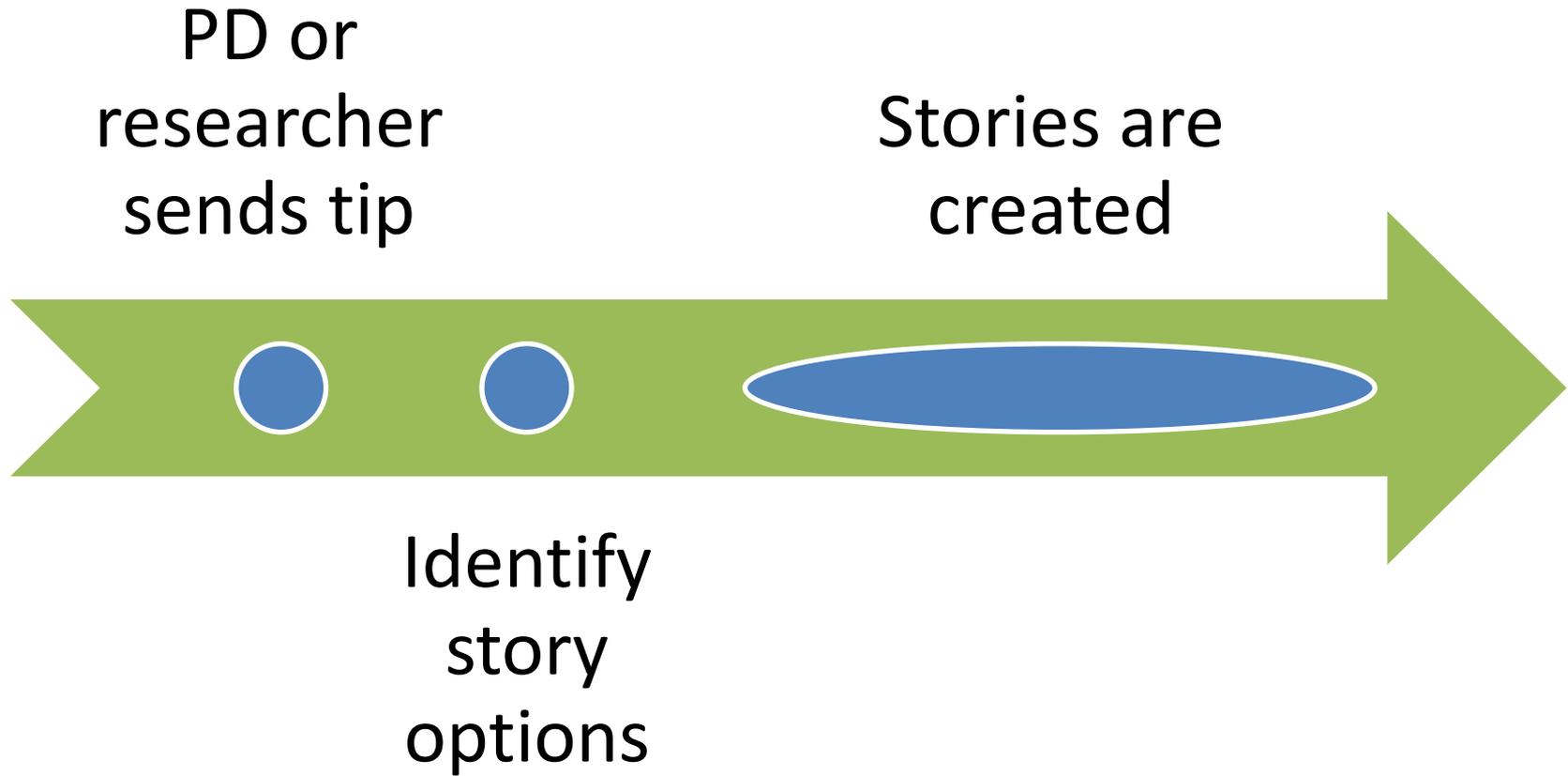
Integrating Nano Research into the National STEM Dialogue

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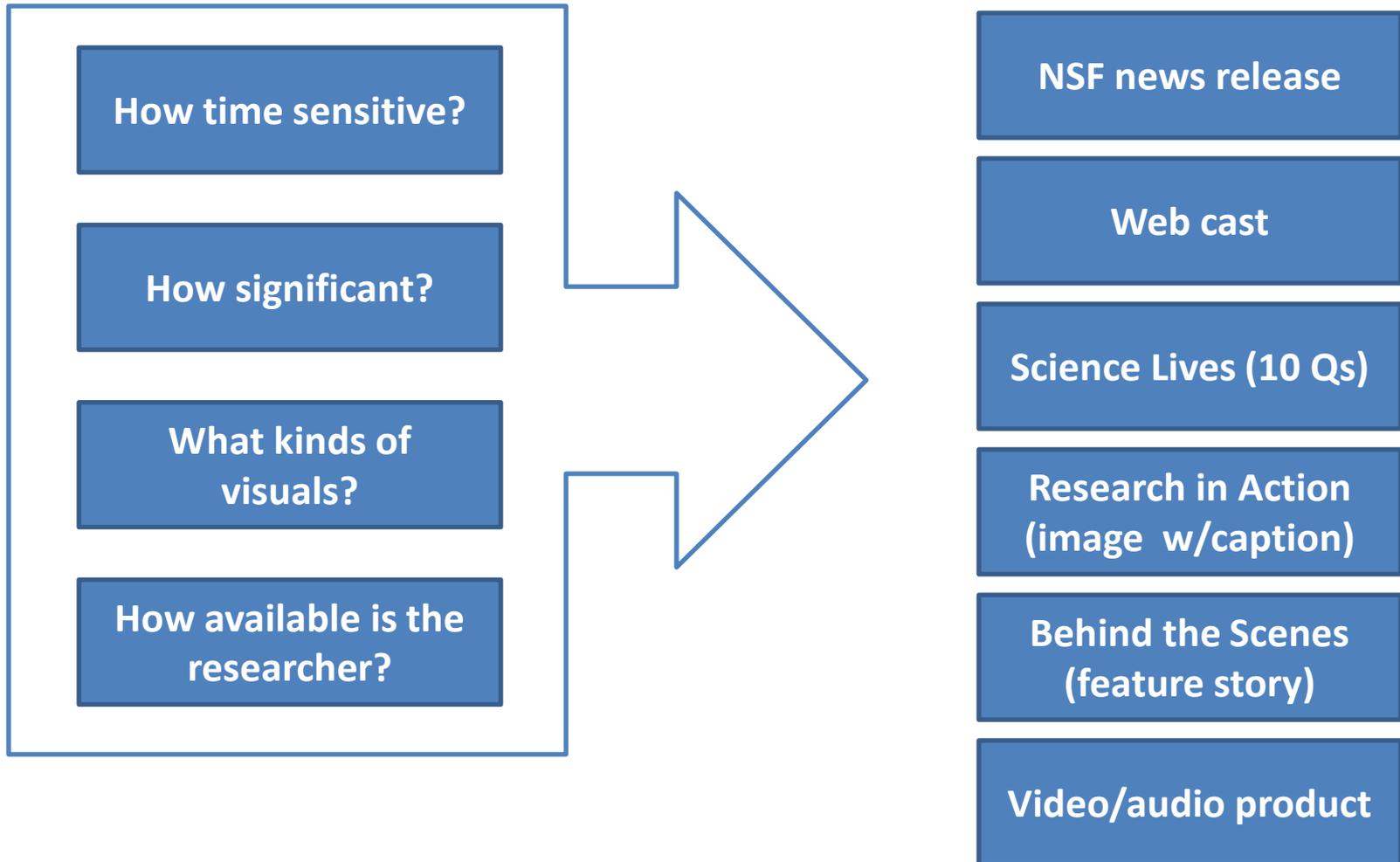
Dec. 6, 2011



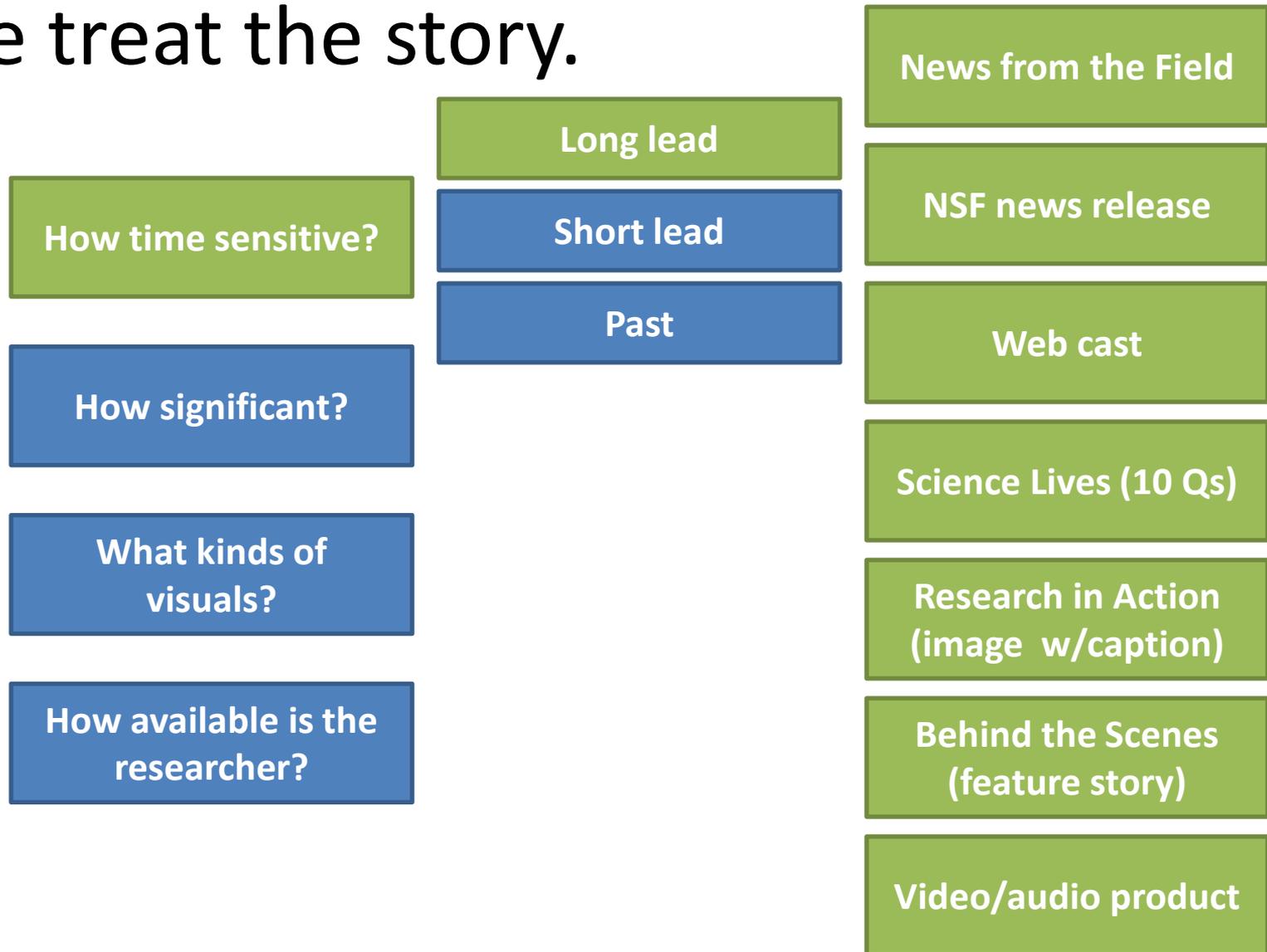
Every tip can be turned into a story...



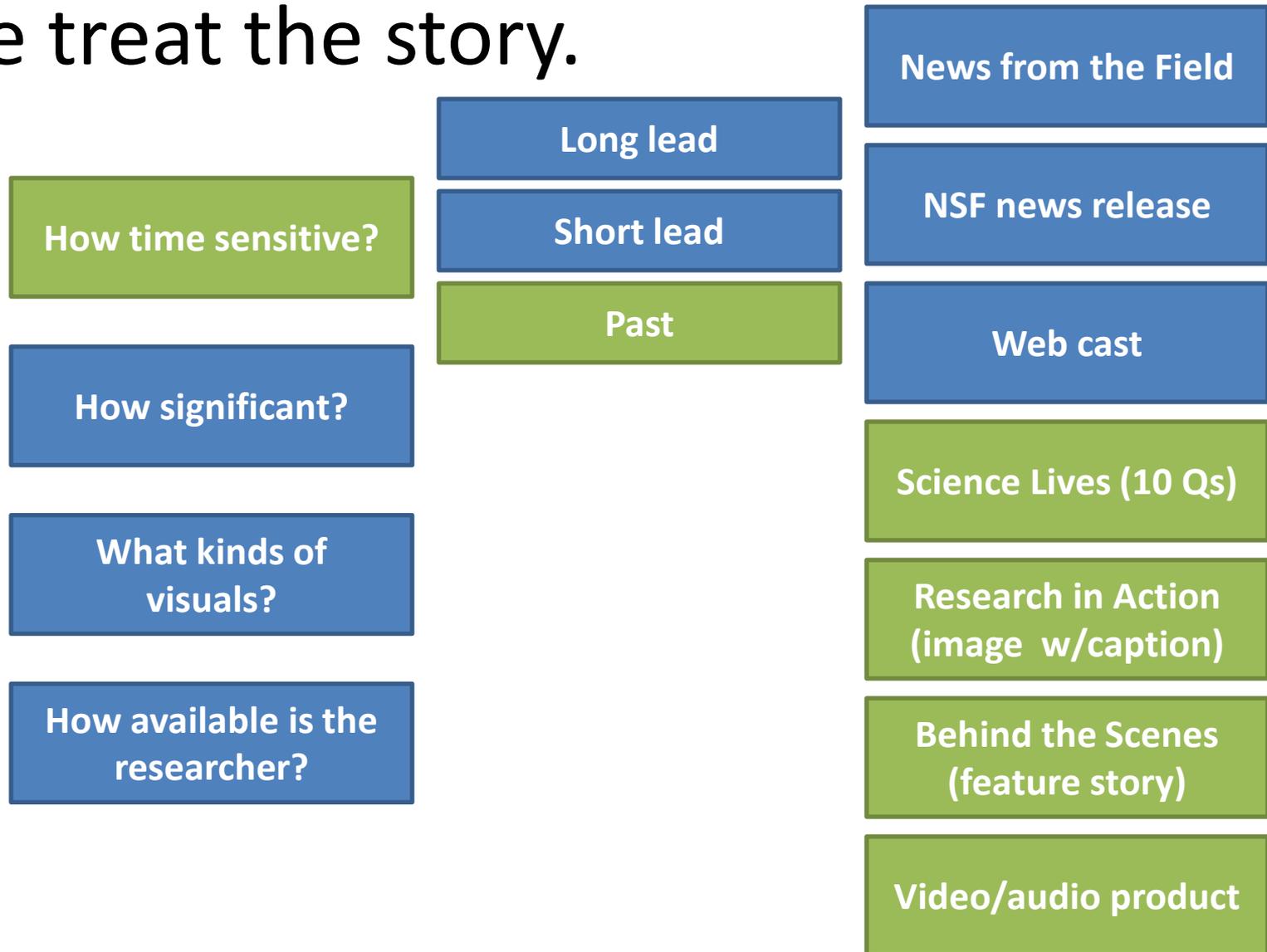
The nature of the tip determines how we treat the story.



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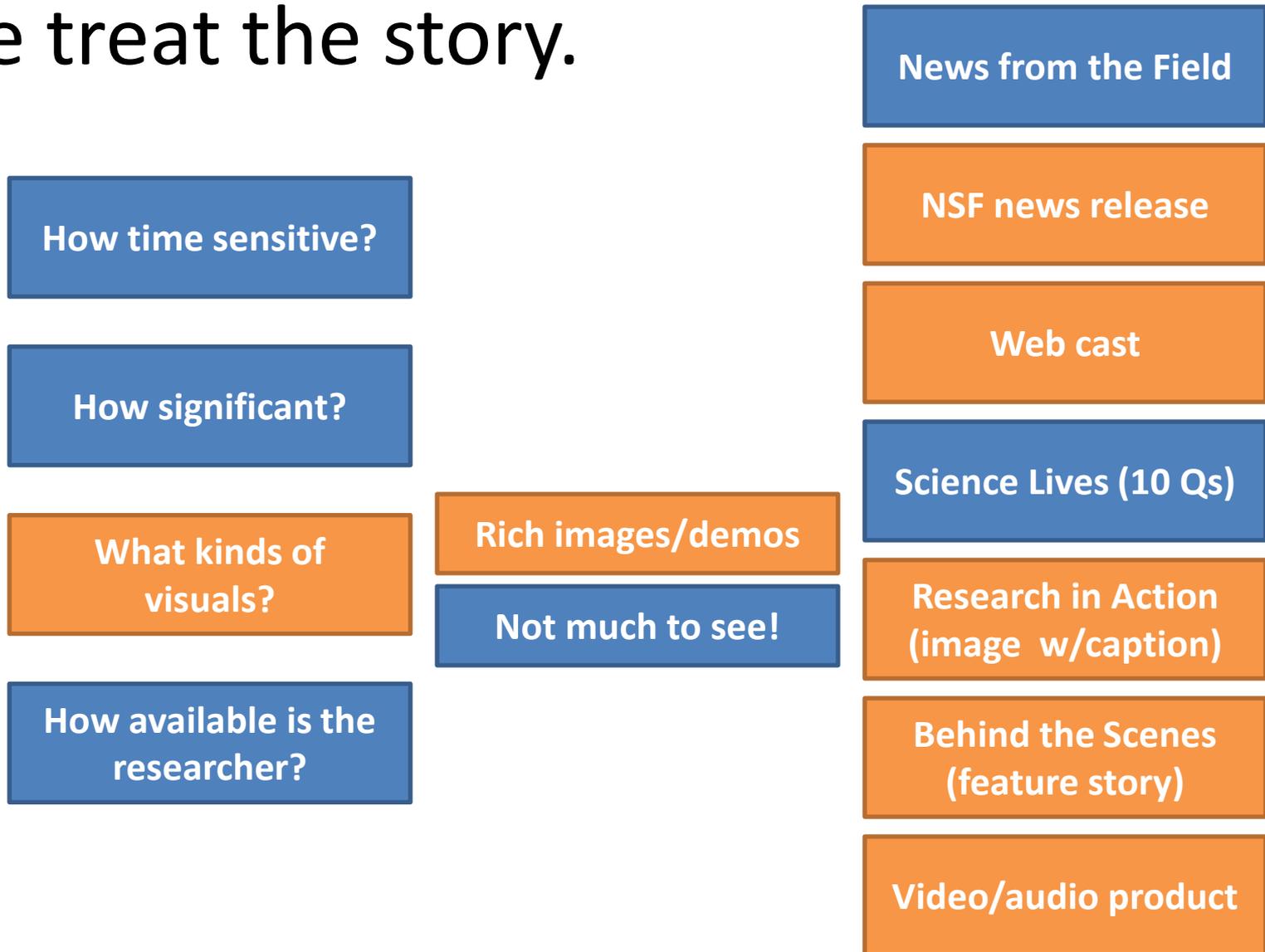
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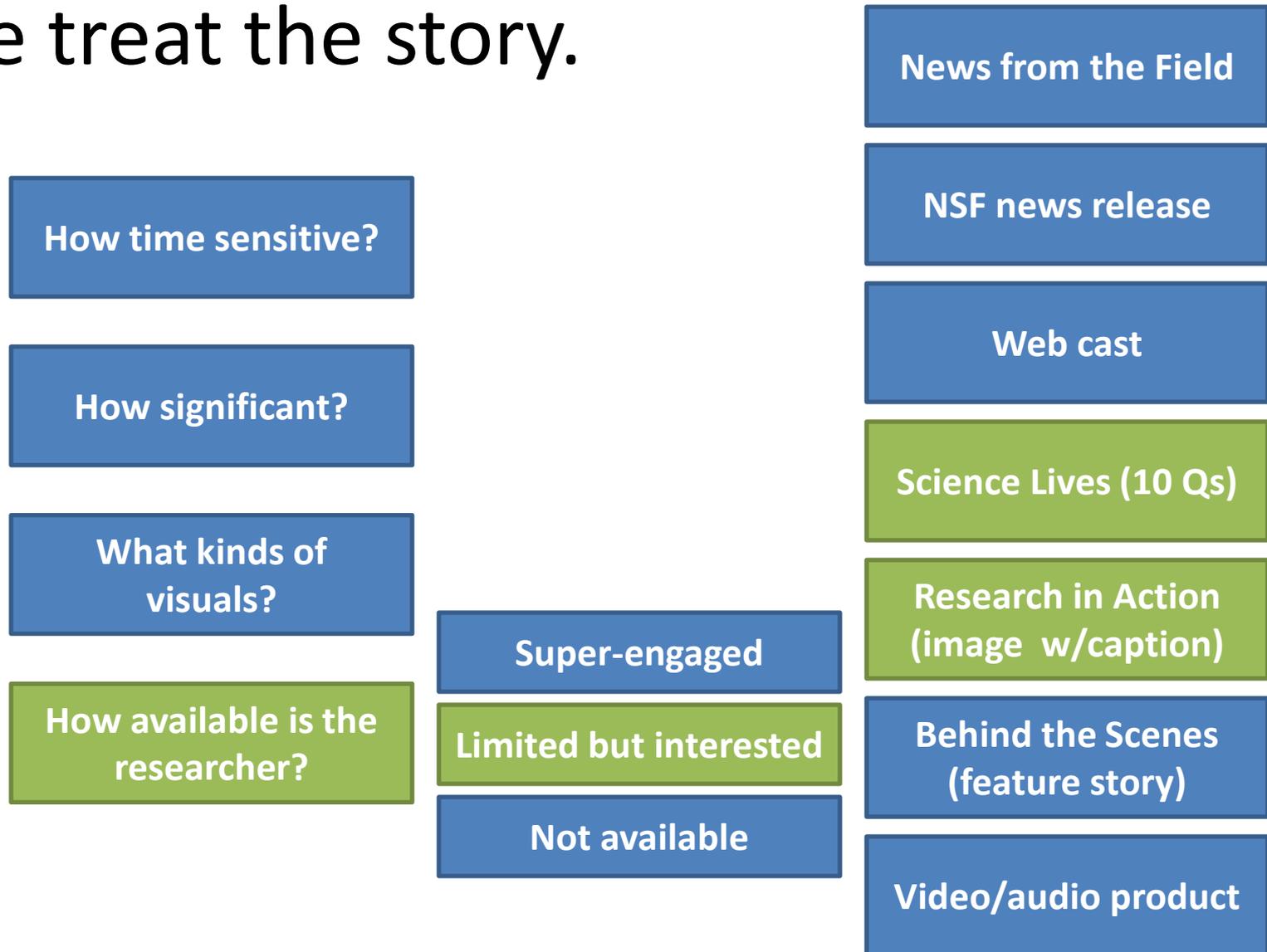
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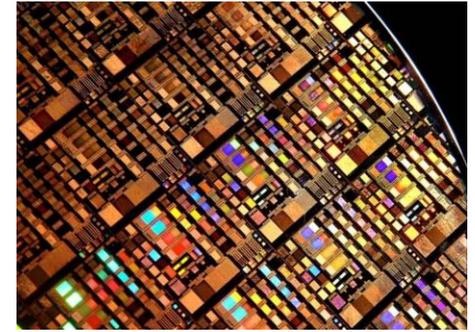
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NSF Highlight Example (ENG/IIP)



TITLE **Gentle, One-step Polishing Technology
for Computer Chips**

OUTCOME Researchers at Sinmat Inc., have developed a single-step polishing process for the copper-based wires that join millions of transistors on a computer chip.

IMPACT This gentle approach may reduce polishing process costs by up to 80%, which translates to over \$4 billion in savings for the computer chip industry. Completion of the project will help the U.S. maintain and extend its lead in nanotechnology, a key area for the nation's future economic health.

**EXPLAN-
ATION** The current state-of-the art polishing process requires multiple steps to meet semiconductor industry quality requirements. Also, existing processes create high stresses during polishing that may not be compatible with the fragile materials now in use. Sinmat's "soft polishing" gently removes unneeded copper from the wires but does not damage their delicate insulating layer. Cost reductions are due largely to the simplification of the manufacturing process, increased product output, and decreased use of capital equipment.

NSF Highlight Example (ENG/EEC)

TITLE **Nano Hits the Slopes**

OUTCOME Engineering students at the University of Nevada, Reno designed and created a snow ski with embedded carbon nanotubes. This state-of-the-art material greatly improves ski performance, allowing skis to better absorb vibration and have greater traction on icy slopes.



IMPACT The design course, developed with NSF support, exposes students to real-world applications of nanotechnology. It also gives students an understanding of the role of nanotechnology in creating improved materials, devices and systems. This in turn helps to spark students' interest and gives them hands-on experience in an emerging area of mechanical engineering.

**EXPLAN-
ATION** Professor Kam Leang, who has been building skis in his garage for several years, wants to inspire mechanical engineering students to get interested in real-world nanotechnology. [Learn more](#) about the project and the engineering course, *Integration of Nanotechnology into Mechanical Engineering*.

NSF Highlight Example (ENG/CBET)

TITLE Inorganic Coating is Better for Food Cans

OUTCOME Researchers have developed new coatings to line steel cans used in the food industry. The coatings are composed of inorganic oxide materials such as titania and zirconia.



IMPACT By replacing the organic coatings that currently line food and beverage cans with inorganic materials, the food canning industry could eliminate bisphenol A (BPA) from these containers and remove the environmental hazards associated with the organic coatings.

**EXPLAN-
ATION** The food canning industry ships about 30 billion cans annually. Substituting the nanoporous inorganic coatings developed by University of Wisconsin researchers for the current coatings would provide a safer, less-hazardous and less-expensive approach to corrosion protection. BPA, a compound associated with plastics, mimics the body's own hormones and has raised concerns about its effect on infants and young children. Organic coatings also emit volatile organic solvents that are harmful to the environment without costly treatment prior to release in the atmosphere.