Online Ethics Center
FOR ENGINEERING AND SCIENCE

Nanosilver Linings Case and Workshop Materials

Description

This is a role play workshop designed for ethics education of STEM graduate students. It primarily emphasizes societal-level macroethics related to decision-making related to commercial application of emerging nanotechnoloies, as opposed to microethics or responsible conduct of research (RCR). However, students will confront dilemmas at the level of individual contact through perspective-taking in acting as one of seven characters in a hypothetical, but realistic, case.

Body

Instructor Notes

Complete Workshop Packet as PDF

PDF of Student Case Material *(To be distributed individually to each team member)*

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To offer the *Nanosilver Linings* case in the context of one, three-hour workshop, the

basic steps are:

- Register **7** students per group. (The workshop can run with either six or seven students, allowing room for one cancellation or no-show without disrupting the role play case.) Doodle internet polling can be used for this purpose, choosing the (free) option to limit the number of participants.
- Prepare materials (copies of the *Nanosilver Linings* case, character folders including readings and private information, nametags, certificates, assessment forms)
- One week in advance, send out the set of readings (highlighted in green) intended for all participants.
- Adapt workshop slides with photos of your registered participants
- Water/coffee and baked goods may be served during the event

Requirements

- Groups of six or seven participants are required for this exercise. It is recommended that, if scheduling a free-standing workshop even, seven participants are scheduled in advance. That way, if there is a cancellation or no-show on the day of the event, the workshop can take place without need for recruiting a substitute on short notice.

Options and Flexibility

Personnel

- The character Carlson, concerned parent, may be included or excluded, allowing a ±1 extent of flexibility in number of participants per group.
- Participants may be engaged in the study of any STEM field, or field related to STEM (e.g. Philosophy of Science, Science Policy, etc.)
- Participants may be from the same, or different, fields.
- Participants may be at different levels of study; this experience was designed with STEM graduate students at any level or year of study in mind, but may also be appropriate for advanced undergraduates.
- Participants may know one another well, or not at all, prior to the workshop.
- Characters assignments may be determined by random draw, by the workshop leader, or by the participants.

Time

- Running time may be adjusted through time allotted for reading, accordingly adjusting the amount and difficulty of readings selected or assigning readings in advance.
- Electronic highlighting can be applied to readings before printout to draw out the most pertinent passages, thus reducing reading time and volume while maintaining the original document context.
- Time allotted for discussion is flexible, and can be used to adjust total running time.
- The length and nature of the break is flexible.

Content

- Selection of readings by the workshop leader allows flexibility with regard to level of difficulty.
- Selection of readings by the workshop leader allows flexibility with regard to subject matter emphasis.

Materials Checklist

- Informed consent form, if applicable
- Identical initial packets for each participant, with case plus selected readings
- Slides with character identities and student photos (prepared while participants are in common learning phase), template provided in Power Point file
- Character specific nametags
- Character specific packets, with character information and selected readings
- Discussion questions/slides (Power Point file)
- Assessment forms

Note to Instructors: When the case and workshop were composed, a number of worthy learning objectives were held in mind. Assessment data have been used identify which, of the items listed here, were indeed achieved. The learning objectives in **bold** were considered the most addressed, with cross-cohort averages between 4 and 5, where 4 is agree and 5 is strongly agree, with the statement 'Participation in this workshop increased my ability to: (specific learning objective)' (n=26). In the current student version of Nanosilver Linings, only the bold items

are included.

Workshop Learning Objectives

- **Identify stakeholders in a complex decisions pertaining to science and technology.**
- **Understand how the perspectives of different stakeholders are informed and communicated.**
- Name indirect obligations and responsibilities associated with designing, making, and marketing products.
- **Appreciate the human factors, conflicts of interest, struggles, and tradeoffs in a participatory governance scenario pertaining to science and technology.**
- Comprehend the role of governance in how science and engineering are applied in the world.
- Identify value-based decisions made in the practice of evaluating emerging technologies around the product life cycle.
- Explain some ethical principles and frameworks applicable to these value-based decisions.
- **List ethical dilemmas involved in public communications about science and technology.**
- **Understand the inherent limits of quantitative, technical methods of assessment in incorporating values.**
- Relate values to the way practice, business, and policy decisions about science and technology should be made.
- Articulate an understanding of a scientist or engineer's professional rights and responsibilities relative to those of consumers and other stakeholders.
- **Operate professionally as a scientist or engineer even in 'grey areas' of practice where there is no possibility of a single correct answer.**

Explanatory text for learning objectives provided to participants:

Participation in this workshop is intended to contribute toward specific objectives for your learning. Unlike much of science and engineering education, is not intended to provide you with specific information or technical competency you did not have before. It is an active experience relevant to your preparation to serve society as a responsible scientist or engineer.

Flow of workshop events, Workshop Leader (with 3-hour workshop pacing information)

Part 1 **(80 minutes)**

Brief welcome statement by workshop leader, including statement about learning goals and expectations (5 minutes)

Common learning phase; Students receive background narrative, public information about all characters, article printouts to establish base of common knowledge), flow of events, and workshop guidelines; (20 minutes)

Visual display of character assignment; Workshop leader presents introductory slides, shows Power Point slide with photo of participant linked to character assigned (5 minutes)

Individual character learning phase; Students are given packets containing private information about their own characters; participants read, gather materials to quote or cite in their remarks, write opening statement for town hall meeting, prepare for directed question phase. (30 minutes)

> (If multiple cohorts of six or seven participants are run in parallel, and additional time should be allotted for participants assigned the same character to meet with one another, comparing and discussing opening statements.)

Town meeting starts with Mayor, each character delivering prepared opening statement (in character) (20 minutes)

Break in Workshop (10 minutes)

Part 2 **(90 minutes)**

Directed question phase (in character); panel consisting of Hansen, Thompson, and Brown receive questions from Green, Jones, Reed, and Carlson (15 minutes)

Conversation phase (in character); any character may direct question or comments to any other character or the group at-large (a free-form discussion) (15 minutes)

Break in character; participants as themselves; workshop leader presents discussion questions and prompts (15 minutes)

Discussion phase, students as themselves; Workshop leader presents slides including discussion questions paired with learning objectives (25 minutes)

Assessment (20 minutes)

> Note to Instructors: The following section contains each character's public and private information (Loui 2009) along with the Guidelines for Role Play. These should be distributed in each individual folder upon role assignment, .

Loui, M. C. (2009). What can students learn in an extended role-play simulation on technology and society? Bulletin of Science, Technology & Society, 29(1), 37-47. doi: 10.1177/0270467608328710

Rights

Use of Materials on the OEC

Resource Type

Case Study / Scenario
Instructor Materials

Parent Collection

NAE Exemplars in Engineering Ethics Education

Topics

Emerging Technologies
Ethics and Society
Lab and Workplace Safety

Research and Practice
Responsible Innovation
Safety

Discipline(s)

Computer, Math, and Physical Sciences
Engineering
Life and Environmental Sciences
Nanoscience and Nanotechnology
Teaching Ethics in STEM