

Applying Phenomenography to Understand Practicing Engineers' Lived Experiences About Ethics in Engineering and its Implications for Ethics Education

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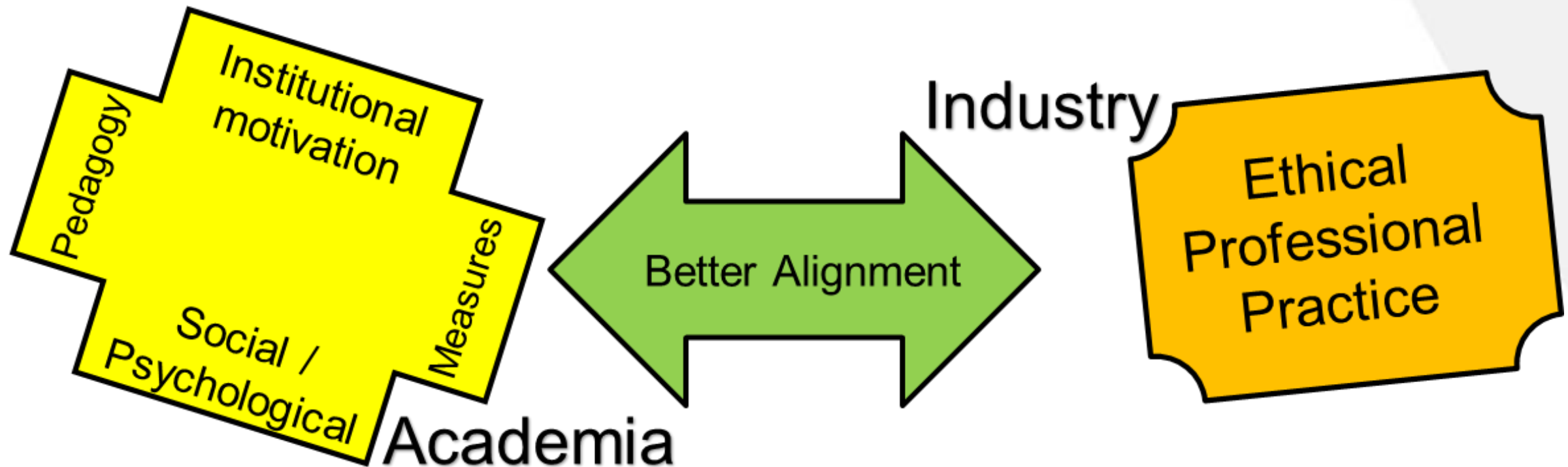
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Can we better align engineering ethics education with engineering practice?

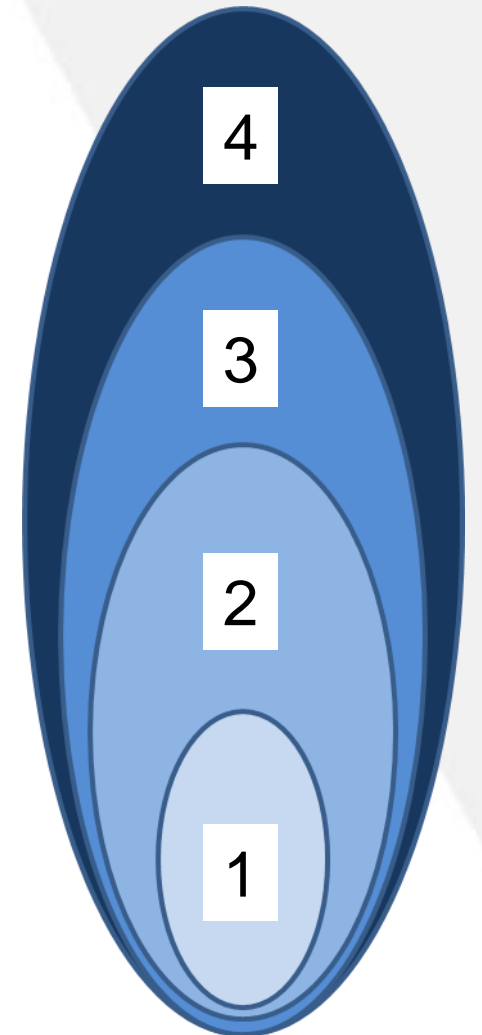


1. What are the qualitatively different ways engineers experience ethical issues in their engineering practice in the health products industry?
2. What patterns of individual and environmental factors contribute to or limit an engineer's experience of ethical engineering practice?
3. How are current frameworks of ethics education aligned with a comprehensive and situated understanding of ethical engineering practice?

1. What are the qualitatively different ways engineers experience ethical issues in their engineering practice in the health products industry?

We used phenomenography as our research methodology

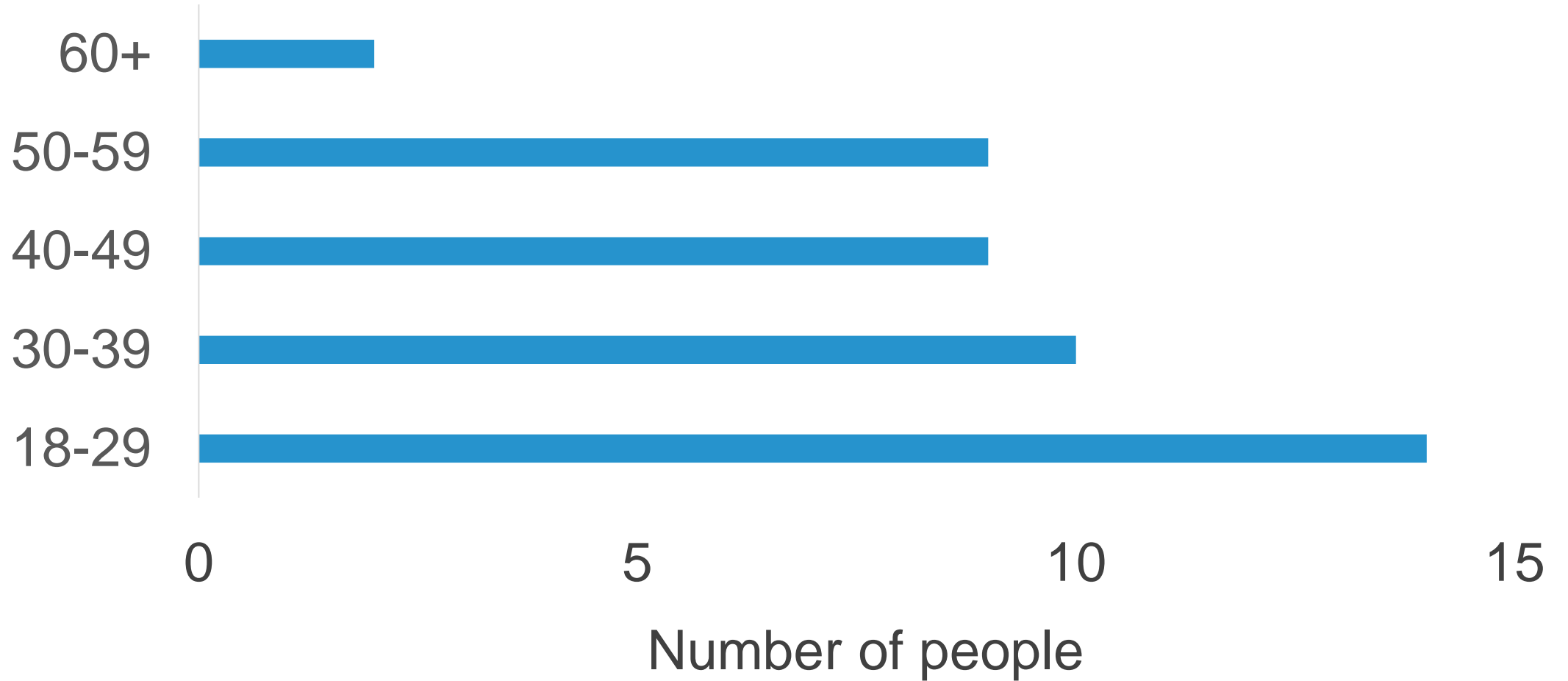
- Goal: To understand the variation in how people experience a phenomenon
- Outcomes
 - Categories of description
 - Relationships between categories



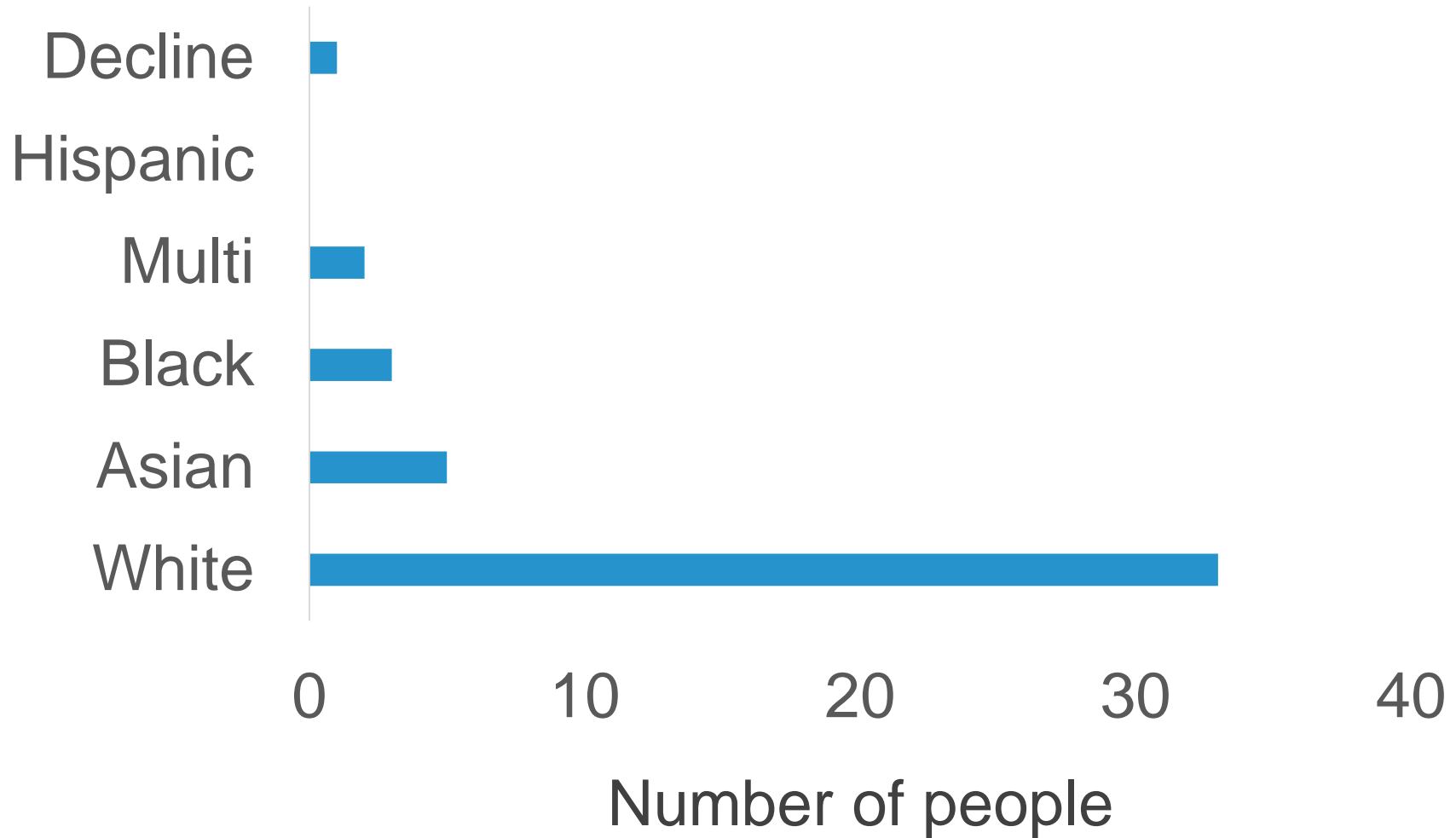
We interviewed 42 engineers in the health products industry

- Six companies: medical devices, orthopedic devices, pharmaceuticals
- Used a screening survey to select for variation across nine key attributes

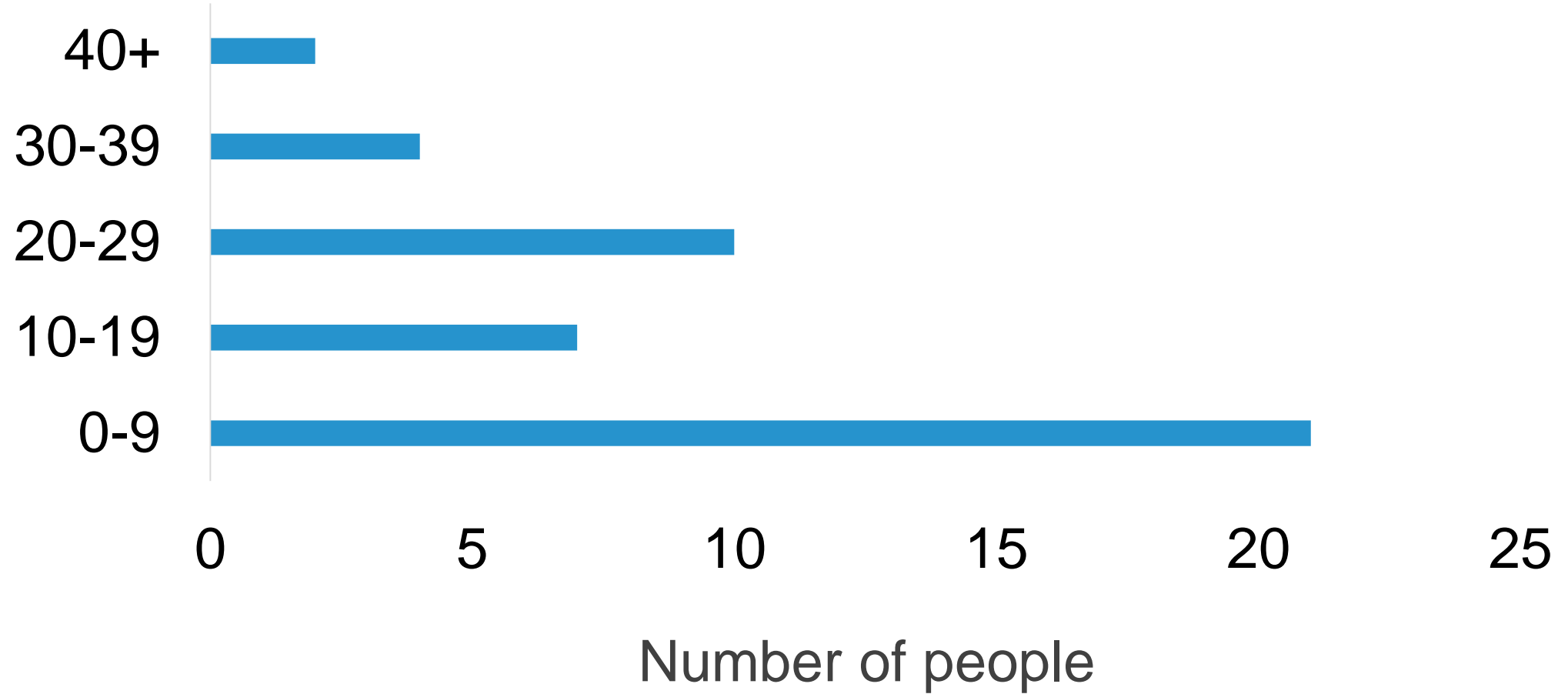
Age Ranges



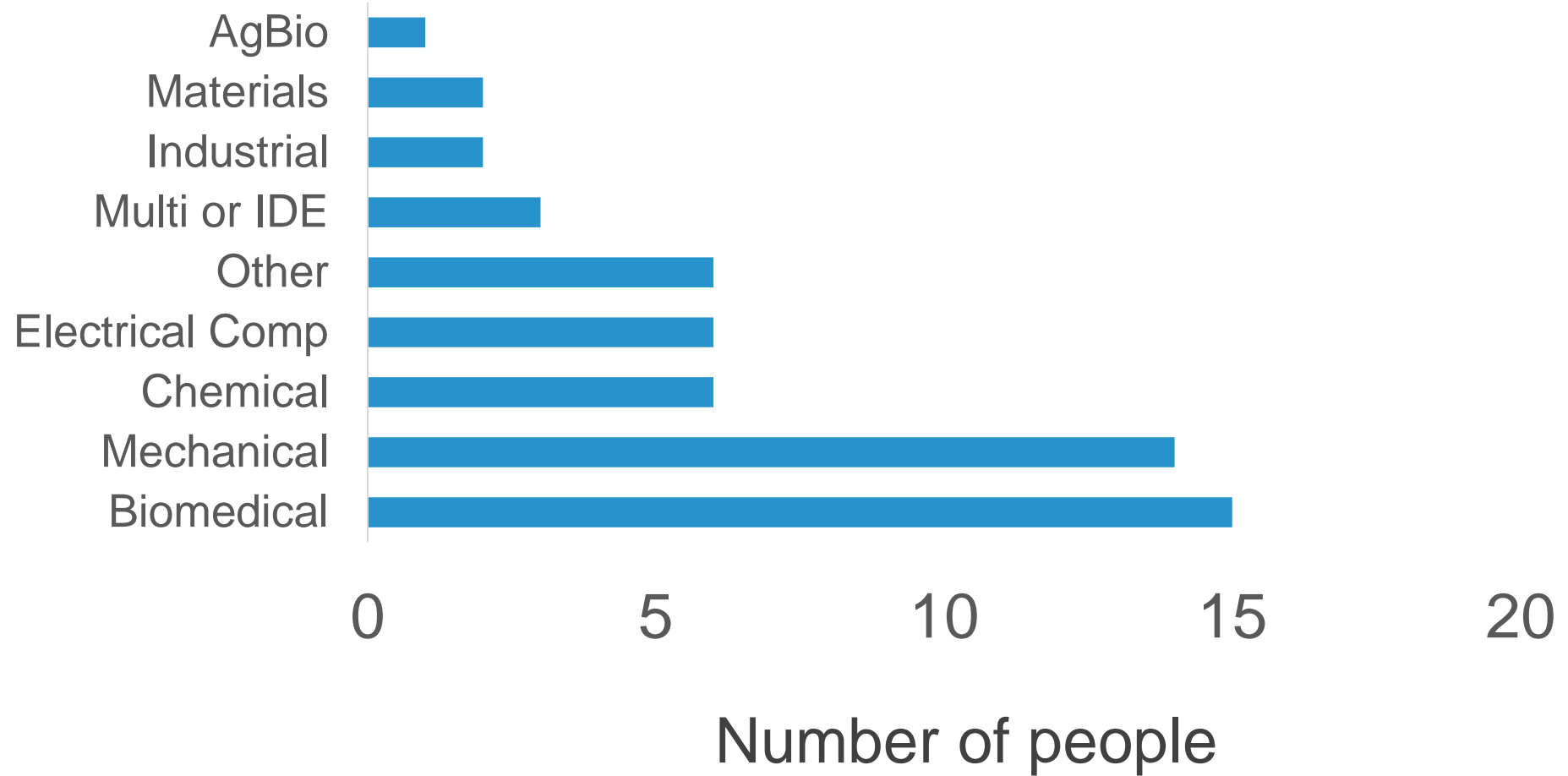
Race/Ethnicity



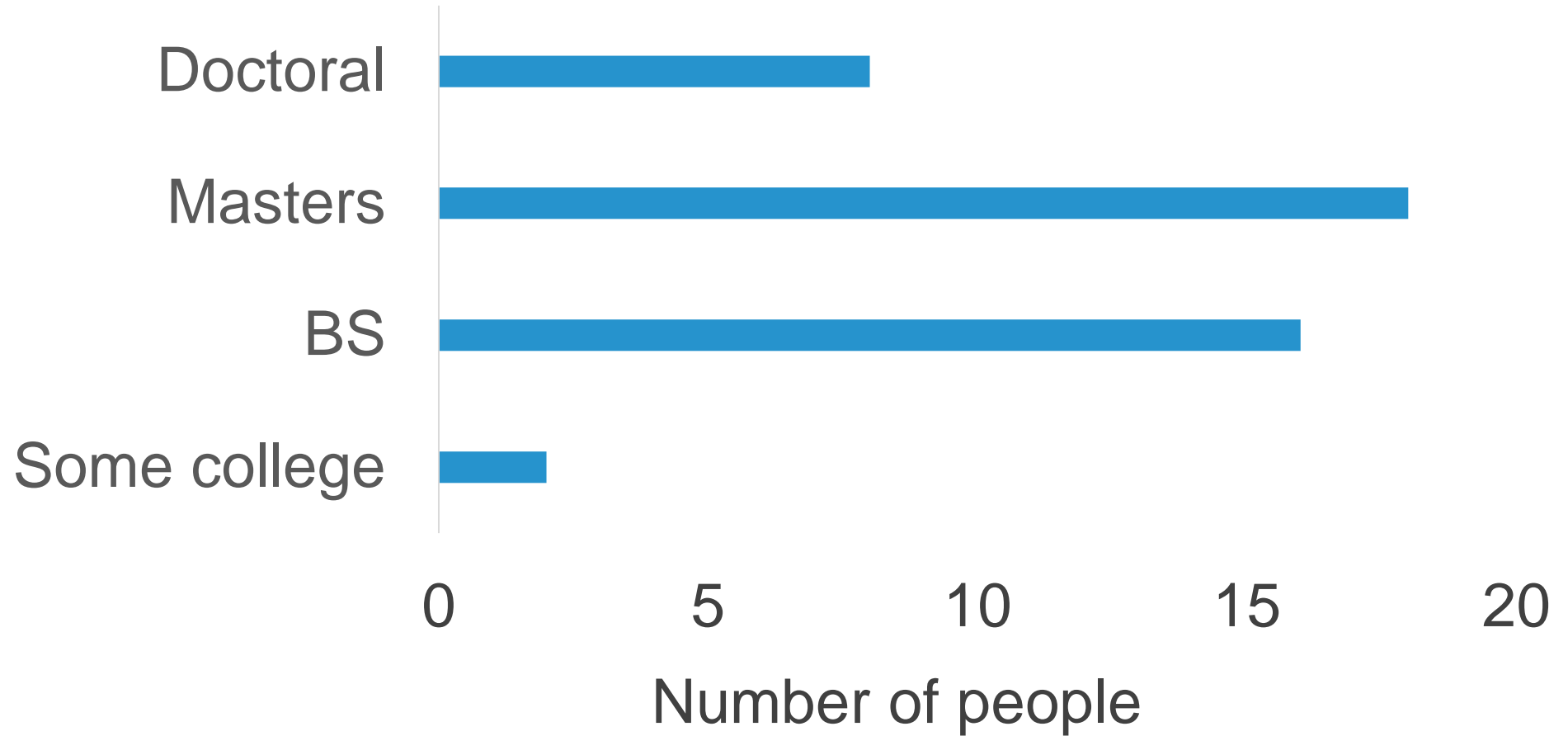
Years in Engineering



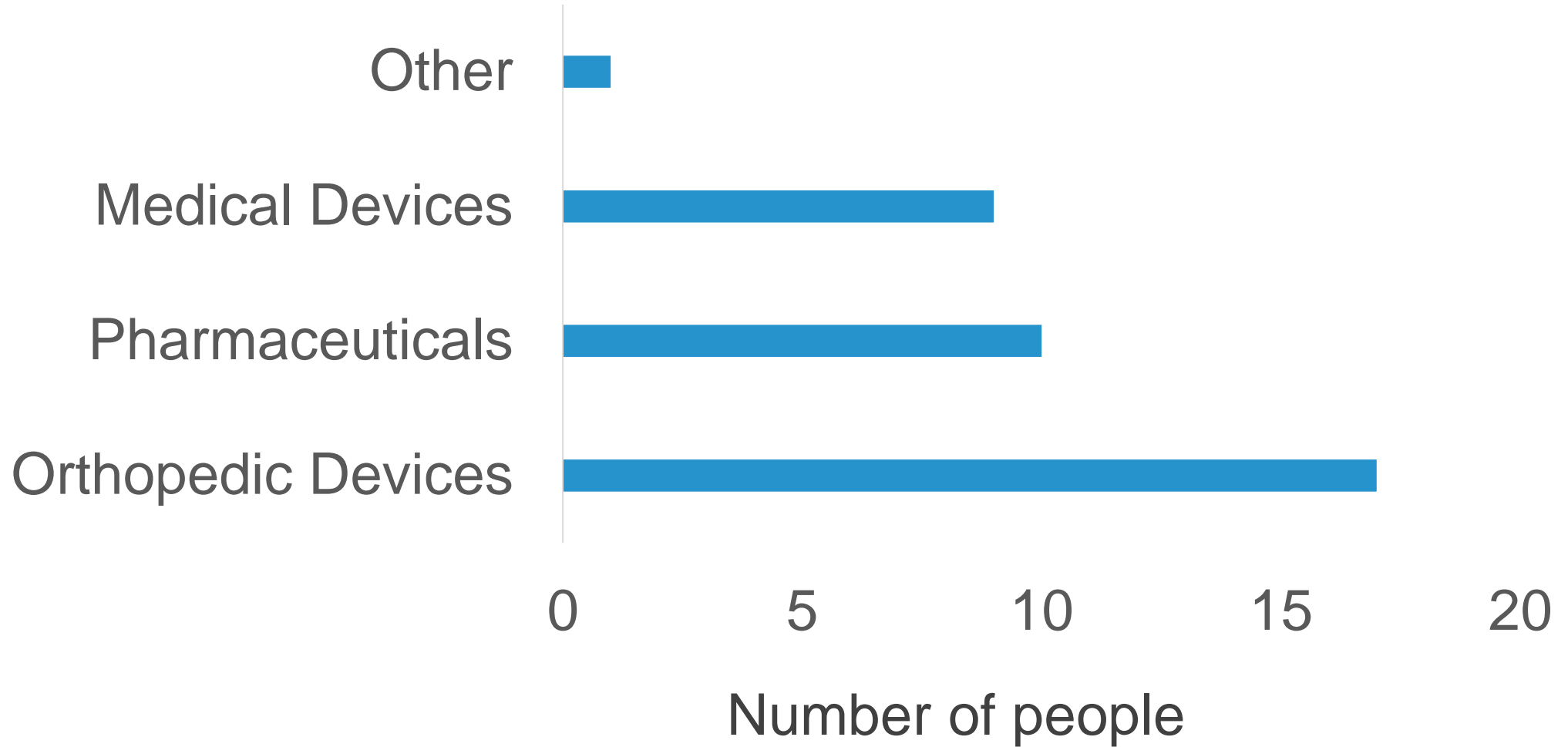
Disciplinary Training



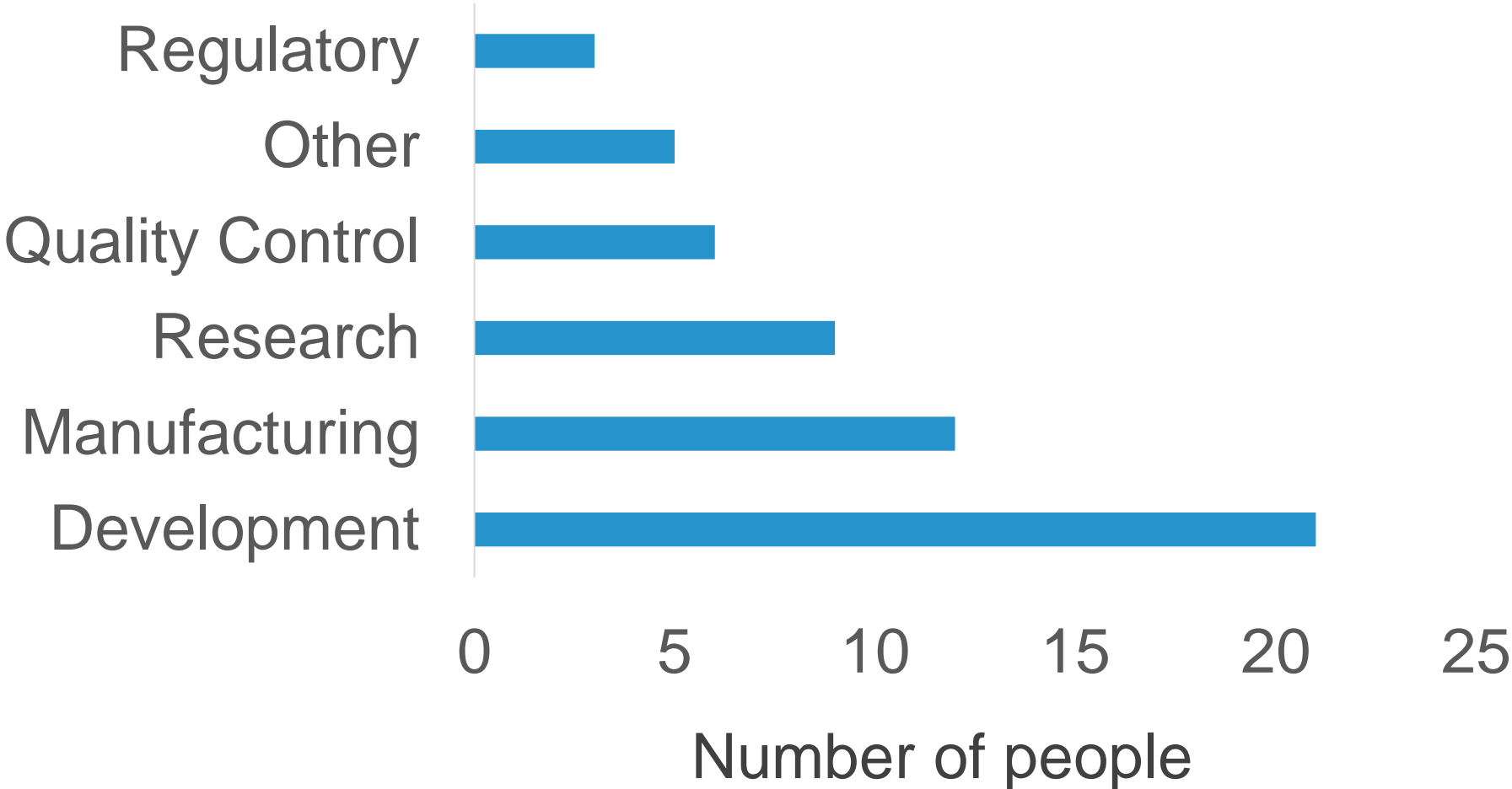
Highest Degree



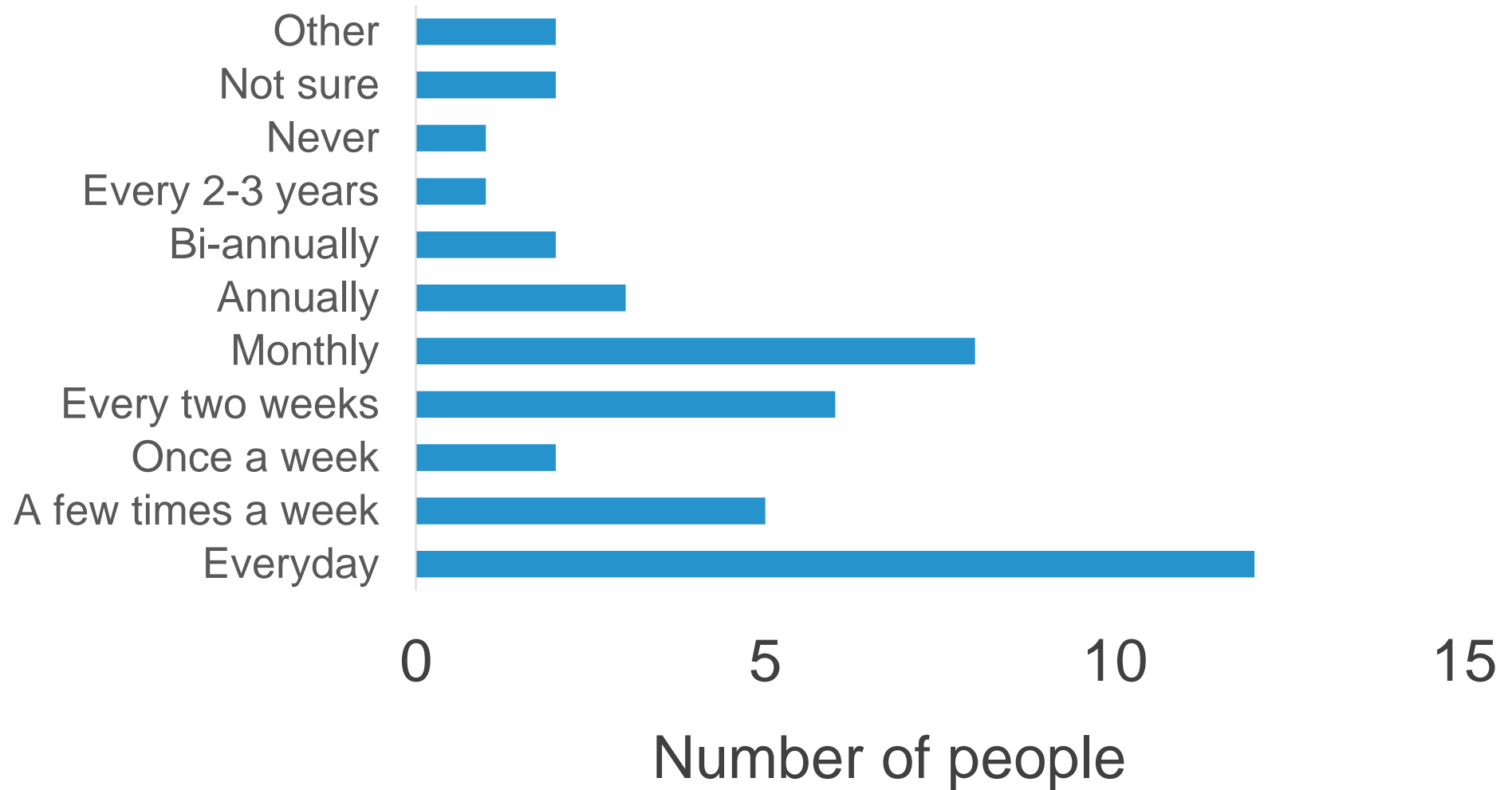
Current Field



Role in Company



Frequency of Ethical Issues



The interview protocol asked about experiences related to ethics

- “Can you describe an experience you have had with ethics in engineering?”
- “Can you describe an experience you had, within engineering practice, that did not involve ethics?”
- “What would you say ethical engineering practice is?”
- “What ethical considerations are important to think about when practicing engineering?”

**Ethical engineering
practice is ...**

Complying with
rules and your
supervisor

**FOLLOW
THE
GUIDELINES**

Producing
accurate, complete
documentation

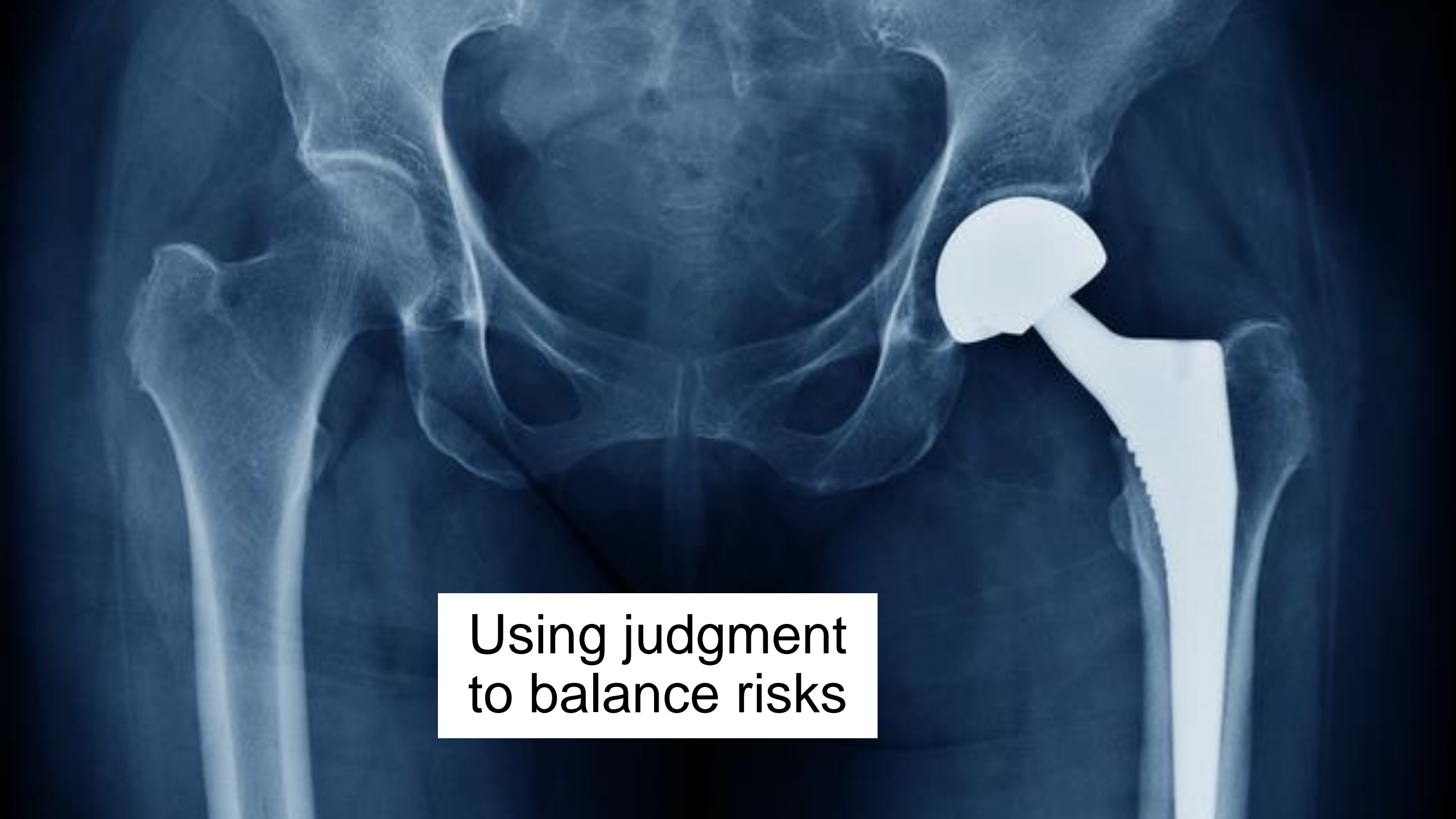




Treating
competitors
fairly

Balancing the
needs of the patient
and the employer





Using judgment
to balance risks



Talking with others through disagreements, beyond legal requirements

In summary ...

- Professional engineers have a range of experiences of ethical engineering practice
- Our category scheme, with dimensions of variation, will help align instruction in engineering ethics with the requirements of actual engineering practice
- Questions: mloui@purdue.edu