Good Computing:

A model of virtuous performance in the profession of computing

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"...we are inquiring not in order to know what virtue is, <u>but in order to become good</u>, since otherwise our inquiry would have been of no use."

Aristotle, Nicomachean Ethics, Book II, Chap 2

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Overview



- The puzzle: What is required to be ethical?
- An inadequate approach: Decision Centered Models
- Moral integrity in the field: Moral exemplars in computing
- The PRIMES model

Decision-Based Moral Advice

- recognize situations needing moral judgment
- be able to *analyze* the issues the situation presents
- *adopt* moral values
- make decisions in a context of ambiguity and disagreement.

From Callahan, D. (1980) Goals in the Teaching of Ethics, in: Callahan, D. & Bok, S. (eds) Teaching Ethics in Higher Education. Plenum, New York, pp. 61-74.



Recognize Analyze Decide





The decision maker is trapped between two alternatives, one good, the other bad, both persuasive. He needs to use reason based on principle to make a choice.

Shortcomings of the Decision Model

- It tends to get trapped in *quandary ethics** -- unsolvable dilemmas or cultural conflicts.
- It provides no help in:
 - How to avoid the need for decision.
 - How to create circumstances to support good behavior.
 - What to do after the decision.
- It is abstract: without the context of a real person's life, commitments, and projects.
- It treats decisions as individual events rather than as part of a larger project or context.
- It ignores a large social science literature on decision biases and situational influence.
- It is based more on experience in the classroom than in the field.



Constructing a Performance-Based Approach:

- 1. Virtue theoretical approaches focus on performance over time, across the life story.
- 2. The study of moral exemplars in professions connects this approach with real lives.
- 3. This and other psychological work allows us to analyze character into multiple components.

Instead of *criteria for a correct decision*, we ask:

What is required to support the performance of the virtues?

(in a profession, e.g. computing)



Which Virtues?

Pritchard* did interviews with exemplars in engineering.

- Responsibility
- Honesty
- Justice (fairness)
- Articulateness
- Perseverance
- Loyalty
- Cooperativeness

- Creative Imagination
- Habit of Documenting Work
- Civic-Mindedness
- Courage
- Openness to Correction
- Commitment to Quality
- Integrity

But the list is likely to be different for different moral ecologies, professions, & cultures. There may be no canonical list: (What do all saints have in common?) So we cannot look for people based on a list.

^{*} Pritchard, M. (1998). Professional responsibility: Focusing on the exemplary. Science and Engineering Ethics, 4, 215-234.

Virtue in the field

- Identify moral exemplars
- Interview them (with a personality test added)
- Code the interviews
- Look for patterns in the stories and codings

Identifying Moral Exemplars

I recruited a panel of computing ethics experts to ground the selection of exemplars.

The panel then agreed on criteria for selection.

Prof. Simon Rogerson, DeMontfort University, UK

Prof. Don Gotterbarn, East Tennessee State University, US

Dr. Alison Adams, University of Salford, UK

Prof. Göran Collste, Linköping University, Sweden

Dr. Barbara Begier, Gdansk Polytechnic University, Poland

Prof. Barrie Thompson, University of Sunderland, UK

Prof. Jeroen van den Hoven, Erasmus University, The Netherlands.

Defining Moral Exemplars in Computing

The classic moral exemplars study was Colby & Damon's (1992) study of exemplars in social service. These were activists in human rights, hunger, poverty, child abuse etc.

We began with their criteria, but modified them to suit the domain of computing. The final criteria were:

- Either a) a sustained commitment to moral ideals or ethical principles in computing, or b) sustained evidence of moral virtue in the practice of computing.
- A disposition to make *computing* decisions in accord with one's moral ideals or ethical principles.
- A willingness to risk one's self-interest for the sake of one's moral values.
- A tendency to be inspiring to other *computing professionals* and thereby to move them to moral action.

Recruiting Moral Exemplars in Computing

Each panel member nominated 3-5 potential exemplars in the UK and in Scandinavia (Denmark, The Netherlands, Norway, Sweden). The unanimous panel approved those selected for contact. The sample was expanded by snowball from the interviewees.

36 in UK and 27 in Scandinavia were nominated (total, 63). 35 were contacted. 24 interviews conducted (a 74% response).

Profile of the Sample

- 13 had significant experience in academia
- 15 had significant experience in industry
- 3 had significant experience in government
- 11 were in the final decade of career and 4 were retired
- 4 were in first decade of career
- 9 were female

The Interviews

Life story interviews (McAdams, 2001) lasting 3 hours in which they told a series of stories (from 19 to 30) about their professional life.



- Life chapters (and overview)
- Peak experience, Nadir experience, Turning point, Earliest memory, Childhood scene, Early career scene, Recent career scene, One other scene
- Positive and negative influences
- Influential stories about others (four of these)
- Positive and negative futures
- Value questions (e.g. 3 most important values in system design)

Who Are They?

- Simon Rogerson: Founder of EthiCOMP, first Professor of Computer Ethics
- Elizabeth France: First Data Protection Registrar in the UK
- James Towell: Cambridge Grad, Private Consulting
- Steve Shirley: Early pioneer in business computing
- Enid Mumford: Early pioneer in socio-technical systems
- Francis Grundy: Pioneer in encouraging women in computing
- *Alan Newell*: Pioneer in developing systems for the handicapped
- Alan Cox: LINUX Pioneer,
- Jan Holvast: Pioneer privacy advocate
- Ove Ivarsen: Developer of the USER Award from LO

Common Themes

- Most maintained a positive focus
- Most cultivated a network of social support
- Most cited multiple people as positive influences
- None saw themselves as morally extraordinary
- All were active problem solvers; problems were often framed as moral/social/technical
- All practiced a set of social/technical skills to create solutions to problems
- Craftspersons focused on users, reformers focused on systems



Craftspersons

Designing computing technology towards ethical ends

- Drew on pre-existing values in computing
- Focused on users or customers who had needs
- Took the role of providers of service/product
- Viewed barriers as inert obstacles, puzzles to be solved
- Believed they were effective in their role

Example: Prof. Alan Newell; James Towell

Reformers

Changing social systems





- Took the role of moral crusader.
- Viewed individuals as victims of injustice.
- Viewed barriers as active opposition.
- Believed in the necessity of systemic reform.

Examples: Francis Grundy; Ove Ivarsen

Making Your Analysis

First, make a listing of the stories told, plot summaries and any interesting detail

For each story, ask:

- What role do they play in each story (reformer, craftsperson, helper, social engineer, educator, other?)
- What skills do they use?
- How do they use or go against their environment?
- How do they use or go against their personality?
- What values do they state or assume? How are they motivated by them?
- What other themes, useful observations, or interesting stories do you find?

What does all this tell you about:

- What this person thinks about virtue in this profession?
- How this person practices virtue in this profession?
- Add your own insight here from reading or experience...

Rating the stories

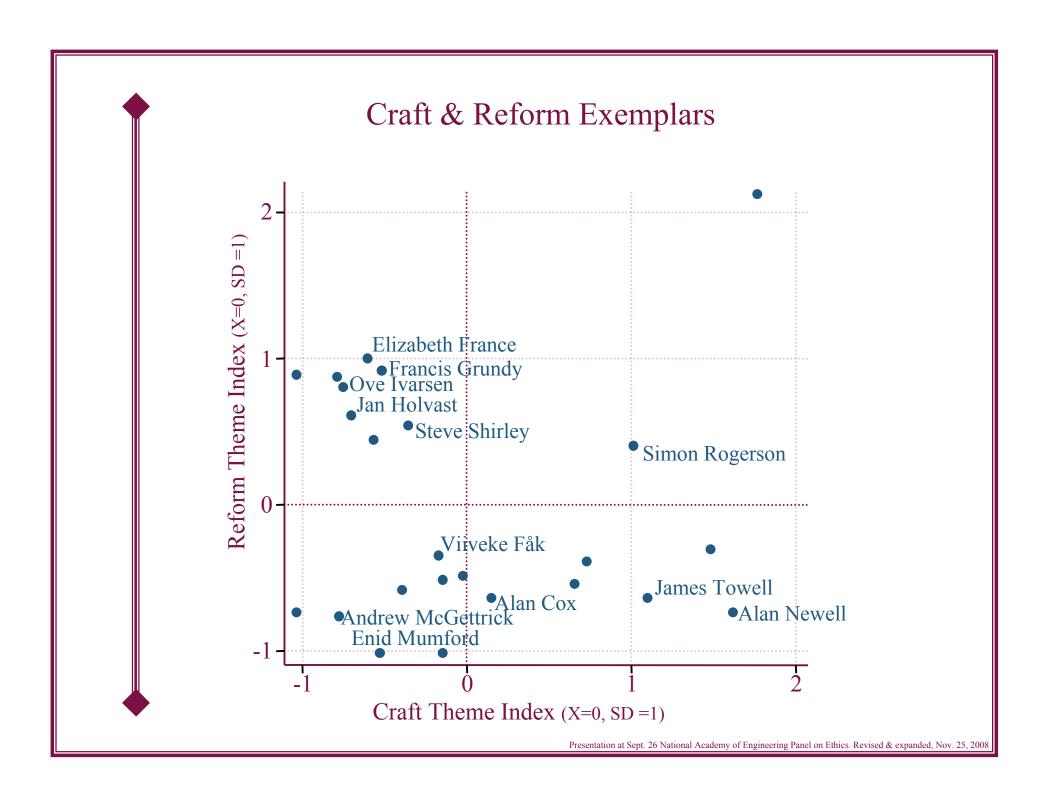
- Use of technical expertise
- Designing for users or clients

Form Craftsperson Index

- Perceiving harm to victims
- Noticing a need for reform
- Taking action for reform

Form Reformer Index

- Social Support
- Social Antagonism
- Effectiveness & Ineffectiveness
- Negative and Positive Emotion
- Use of social expertise



From Exemplars to Virtues

- There are likely multiple kinds of moral exemplars and moral careers.
- Four components interact to influence the shape of moral careers and the expression of virtue over time.
- *Character* is distributed among the different components
- *Virtue* is expressed in the coordination of these components in the projects the person undertakes.

PRIMES: A Four Component Model of Virtue

(see Huff, Barnard, & Frey, 2008a & b)

External

Moral Ecologies

<u>Per</u>sonality

Integration of Morality into the Self System

Moral Skill Sets

Internal

Low

Control

Mutability

High

Presentation at Sept. 26 National Academy of Engineering Panel on Ethics. Revised & expanded, Nov. 25, 2008

Personality Grounds Performance (1)



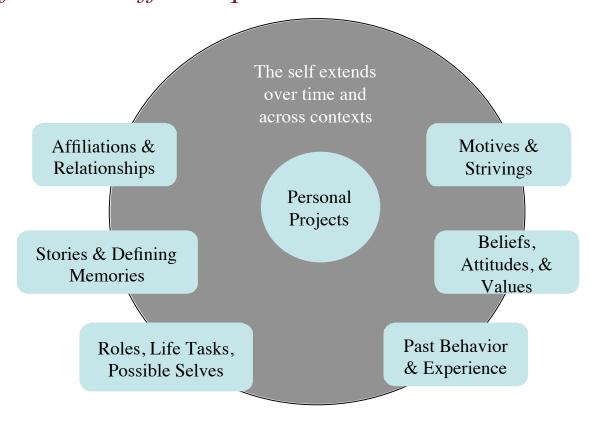
- Exemplars were more *extraverted*, agreeable, and open to experience, and less *neurotic* than national norms (all p's <= .01)
- Those who were *extraverted* were more likely to be reformers (r = .45, p = .026)
- Those scoring high on *Openness to Experience* were more likely to score high on craft (r = .39, p = .059)

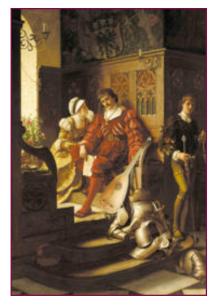
But personality does not determine performance.

Moral Commitment Guides Performance (2)

Integration of Morality in the Self System

Moral commitment takes many different, complex forms in different persons and moral careers





But moral commitment does not guarantee performance.

Adapted from McGregor, I, & Little, B. R. (1998). Personal projects, happiness, and meaning: On doing well and being yourself. *Journal of Personality and Social Psychology. Vol* 74(2), 494-512

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Moral Ecology Shapes Performance (3)

The somewhat stable, but constantly negotiated set of values, procedures, etc. that are

- Held by the members of the ecology or cross-cutting ecologies, and
- Embedded in the socio-technical system of a culture, profession, organization or work group
- Have a *trajectory of change*, influenced most by those with power
- There are *multiple intersecting ecologies* ranging from country-level to local work groups and mentorship networks



- They *constrain* and *support* people's projects
- People can *enter*, *leave*, *influence*, *construct* and *maintain* them (and so Moral Ecology does not determine performance)

Skills Support Performance (4)

Moral *skill sets* undergird the work of our moral exemplars. Both social and technical skills predict *effectiveness* in our exemplar's stories (p < .05).

- Moral Imagination
- Moral Creativity
- Reasonableness
- Perseverance



But skills do not guarantee moral effectiveness.

Moral Imagination for Software Design

projecting oneself into the perspective of others

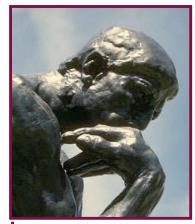
• *Skills:* constructing the relevant stakeholders in a socio-technical system; data collection about stakeholders; understanding stakeholder perspectives



• *Knowledge:* specific knowledge about the domain (e.g. privacy, safety, equity); knowledge of socio-technical systems; knowledge of methods

Moral Creativity for Software Design

generating solutions to moral challenges while responding to multiple constraints



- *Skills:* identifying value conflicts in a sociotechnical system; constructing and evaluating solutions under constraint
- *Knowledge:* specific knowledge about domain (e.g. privacy, safety, equity); technical knowledge of constraints and opportunities; knowledge of socio-technical systems

Reasonableness for Software Design

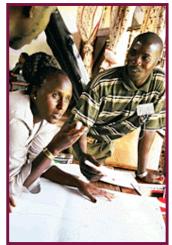
Gathering relevant evidence, listening to others, and giving reasons



- *Skills:* constructing data-based and reasoned arguments; engaging in reasoned dialogue
- *Knowledge:* specific knowledge about domain (e.g. privacy, safety, equity); technical knowledge of constraints and opportunities; knowledge of ethical argumentation

Perseverance for Software Design

planning moral action and responding to unforeseen circumstances while keeping moral goals intact

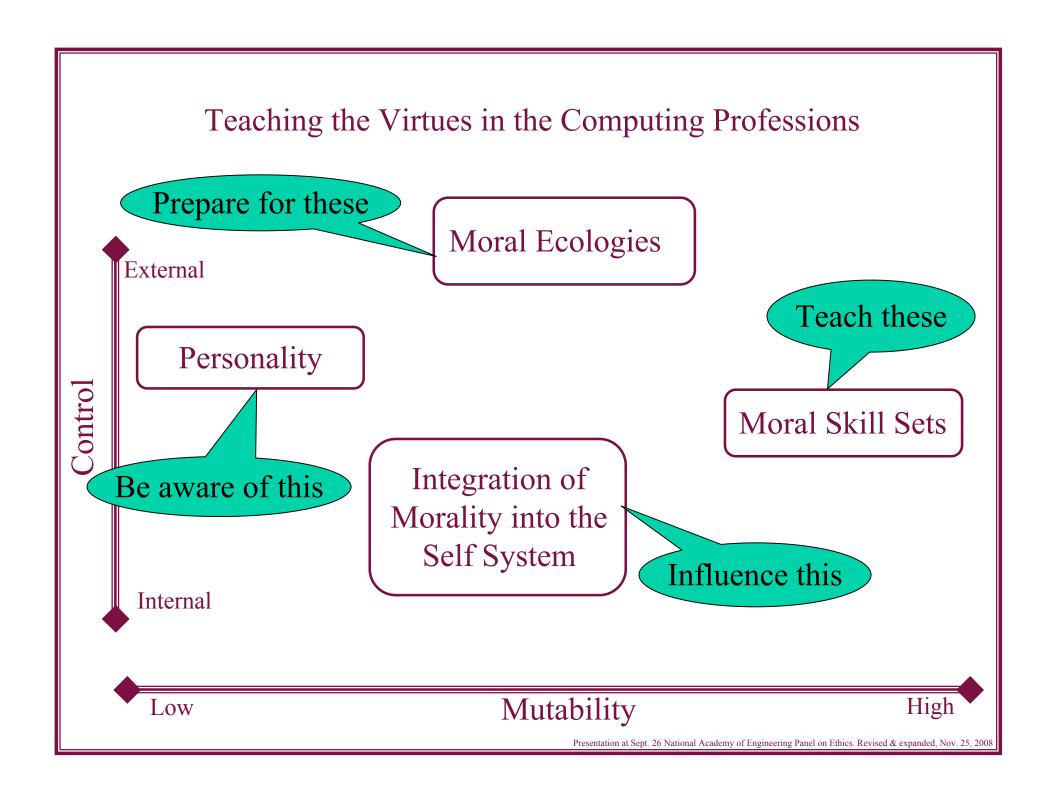


- Skills: constructing and revising implementation plans based on organizational constraints
- *Knowledge:* specific knowledge about domain (e.g. privacy, safety, equity); knowledge of socio-technical systems; knowledge of ethical dissent and whistleblowing

How to acquire skill sets?

- Narvaez & Lapsley (2005) draw on the work in expertise to suggest that practical wisdom should be learned in structured environments that
 - Reward correct solutions
 - Match *explicit theory* and *strategy* with *practice* and *coaching*
 - Provide extensive, focused *practice*

We learn a craft by producing [its] product; ... we become builders by building. Aristotle, Nicomachaen Ethics, Book II



Measurement

- Personality
 - Embarrassment of riches here, but Big 5 is a good beginning (McCrae & Costa, 1999).
 - Others might be added as evidence indicates (e.g. *impulsivity* and *responsibility denial*).
- Integration of morality into the self system
 - Personal projects analysis (Little & Gee, 2007) allows tracing of integration in projects.
 - Various values scales (e.g. Schwartz, 1994) provide models for values measurement.
- Skills and knowledge
 - Benchmarking of novice and expert skills by Keefer & Ashley (2001) provides a model of skills measurement.
 - Bebeau & Toma (1999) provide a model of intermediate concepts measurement.
- Moral Ecology
 - Organizational Ethical Climate scales provide categorization of perceived moral ecologies (Cullen, Victor, & Stephens, 1989).

What the model does

- Helps to focuses effort in teaching: what can be taught, and how can it best be learned?
- Provides a path to measurement of what is learned and the interactions of what is learned with other components (e.g. moral ecology).
- Likely generalizes to other professions, but with emphasis on different skills, etc.

What the model does not do

- Provides no guidance in the analysis of particular ethical duties, issues, or proposed solutions.
- Lacks a developmental element (how do the components interact over time to describe moral careers? What drives this development?). See Lent, Brown, & Hackett (1994) for some suggestions.

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