1) Description of the moral problem

You are a PhD student, and have just written a scientific paper which is ready for submission. Your supervisor has not been helpful in the process, and has not contributed in any substantial way to the paper. However, she/he is usually always added as a co-author to every paper from your department. She/he is also an authority in your field, and having her/his name on the paper might improve your chances of getting it published.

Dilemma: - Do you add your supervisor as a co-author?

2) OLE (A tool for evaluating IT with regards to organization, learning and ethics)

(This part of description is based on Liu Zhiying's project).

Ethics, internal relations and relations to society at large

1. Will there be any ethical problems or conflicts in the context, in the organization or in the group where your project or the results of it will be applied or used?

Answer: In my group, people are trying their best to seek for the potential for emerging electronics for large area, low-cost, and flexible applications. As far as I know, there will be always trade-off between the price, performance and environmental consume. In order to achieve high performance with low cost, some researchers tend to neglect the side effect of environmental consume including material, fabrication, package, etc. This is definitely an ethical problem and conflicts with the whole society. My project is about using carbon nano-tubes (CNTs) as the channel material, to facilitate high performance thin film transistors (TFTs), which is the backbone of electronics. Generally speaking, there are not any big ethical problems. However, as the scientific report saying, the toxicity of CNTs are not proven yet. We can not make it precise that whether it is 100% compatible with human body. Some people want it to be used in biology, medicine delivery, etc since it has been shown some potential in these areas.

2. Will your project or the results of it cause any ethical problems or conflicts?

Answer: The research work itself has no ethical problem as we have mentioned in Question 1 since we are now mainly focus on electronic application of CNTs, not biological or medicine fields. For the results, as mentioned in the dilemma of our group, sometimes there is someone maybe I think is not so important to be involved in the publication as one of the co-authors but it always appears. That is one of the ethical problem I am thinking.

3. What groups, individuals, organizations, etc, will in any way be affected by or have a stake in the development, use or mere existence of your project or the results of it? (Including society at large and the environment)

Answer: The effects of my project can be divided in several aspects:

1) The effect to research committee:

> As we known, electronics, as a subject itself has been developed for several decades and has a big effect in the daily-life of human-being. After the era of Si, which era will it be? All the scientists and searchers are having the responsibility to think about this. Although it is quite risky, we think we have the responsibility to solve the challenges in CNT based electronics just like Si era came only after the finding of its perfect dielectrics SiO_2. As a member in scientific committee, the results of my project will definitely refresh the knowledge of the researchers in the other group, like Rogers' group in Illions University, Alam's group in Prude University, many groups in Japan, etc.

2) The effect to industry:

> The industry is always keeping their eyes open to find the most potential technology. In my project, there are some new technologies which are quite close to the applications and fit the needs of companies. It will be helpful for the industry to make new develop strategy.

3) The effect to individuals:

> Are the co-authors will be horned if our results are important and significant and their reputation will be improved if the work is well-recognized. For my supervisors and other senior scientists, it might be helpful for them to enlarge their reputations, to apply some financial funding, and to develop their activities. For me, the PhD student, it is a necessary and good process to learn how to do research.

4) The effect to environment:

Answer: My project is aiming at material saving, simpler fabrication, and environmental friendly application. It will be positive to the environment.

4. What values, interests, duties, standpoints and attitudes are involved in the use of your project or the results of it?

Answer: The motivation of my project is to develop novel, high-performance, flexible TFTs for large-area applications like displays, solar cells, using novel solution processes like printing technologies. If the performance of such TFTs can satisfy the certain requirements, of course

the cost of such product is much lower, so there is huge profit in such areas. As for the duties, as we known, the human society is developed with the development of science and technology. The human society has developed from "stones age", "iron age". Now it is in the age of Silicone. People may ask, what is the next age? It is our duty, the people in emerging electronics, should answer. The standpoint of my project now is that the material CNT itself has already proven of great potential in electronic properties. The challenge now is how to control the material to become processable. As myself, a PhD student, I am quite positive to my project.

For the results, it will closely relate to all the co-authors including the supervisors who have to find money for the running cost of the project, the students who are learning new knowledge in the process of doing the project and the senior scientist. Who should be involved is always a difficult question to answer because people contribute from different way and how to evaluate the contributions, and different people have different standards. It is a well-recognized rule that only the people who have contributions to the scientific work can be involved in the publication.

As we have mentioned in the dilemma, perhaps the student and the supervisor have different opinion on contributions. In this situation, the possible attitudes are: 1) publish with the supervisor; 2) publish without the supervisor; 3) negotiate between the PhD student and the supervisor;4) not publish.

5. What effects will your project or the results of it have on each of these values, etc? Will your project or the results of it fit certain values and conflict with others? What values and how?

Answer: For the supervisor, more publications are helpful for him to have new ideas, famous reputations, and enough instruments in hunting for more financial support and enlarge their research activities. For the senior researchers, it is necessary for their career development and possible to get promotion with a strong C-V with many significant publications. For the phD students, to get publications is the best process to learn how to do research and improve themselves through this process.
In case 1), the supervisor might be pleased; but it might not respect others' work.
In case 2), thinking about the real job, the other co-authors might feel not being respected. The supervisor might be angry with the student and the student might can not proceed the project without his/her finical support.
In case 3), through negotiations, the student and the supervisor can discuss how they think about contributions and author lists. The student might get more help from his/her supervisor.
In case 4), clearly, it is not good for everyone.

6. What will you do to make sure that the use of your project or the results of it will be optimal with regards to ethical aspects? For instance if it is an IT system, adapt the design of the product, user training, organizational changes, inform stakeholders, etc? How exactly are you going to succeed with this?

Answer: As for my project introduced in Question 1, the use of my project is aiming at novel applications including large area display, solar cell, etc, rather than biology or medicine although it has the potential in these areas. In this aspect, I think I will wait for the material scientists to make sure that it is compatible with human body.

For the authorship as we discussed in our group, In think 3) is the optimal choice. Both the student and the supervisor will be clear what they are thinking and it is possible that the student can get more help from the supervisor. I am quite sure that we can find a nice way through communications.

3) Heteronomy and Autonomy

Problem owner: PhD Student

The dilemma: Include or exclude unhelpful, but knowledgeble, supervisor as co-author to paper?

Heteronomy Authoritarian and constrained thoughts	**Autonomy** Systematic, critical and holistic searching
Reflexes or emotional reactions **(Dominated by one automatic thought)** • It is wrong to include people who have not contributed! • I'm going to lose my supervisors support if I do not include her/him! • I'm going to lose my funding if I do not include her/him! • There's going to be conflict! • I don't like the system! • Whatever is the norm is fine by me **Dogmatic and uncritical thoughts** **(Fixation to one important principle)** • You should not be an author unless you've made a significant contribution • The person responsible for funding a project should always be included • You should follow the established routines • You should always do what you feel is right • You should always do what is best for you	**Valid, relevant values, interests etc.** **(Who is affected? What are their values?)** • Do I want to please my supervisor? • Does my supervisor expect to be included? • Will my reputation be affected by the inclusion of my supervisor? • What is the standard procedure? • Will the reputation of my department or supervisor be affected? • Do I care about the reputation of my supervisor/department? • Will inclusion affect my chances of getting published? **Possible actions and values** **(What can be done? How are all values affected?)** • Negotiate with supervisor • Submit without including supervisor • Include supervisor • Don't publish • Let supervisor decide

4) AT (Autonomous Thinking)

Problem owner: Postgraduate student
The dilemma: You have a Supervisor that have financed your Ph.D. but don't contribute to the work, should he be listed as an author on your paper?

Autonomous thinking	All principles, values, interests, duties, feelings, needs etc. of all involved parts				
		Relation	Financing	Merits	Own reputation
All reasonable alternative actions to solve the problem	Negotiate	**Possibilities:** SV might listen Maybe the Good way **Risks:** Relation might be damaged	**Possibilities:** Maybe the safest way **Risks:** Harder to get funding in the future	Possibilities: Depends on the outcome **Risks:**	Possibilities: Strong, fearless factualistic **Risks:** disobey rules Selfish
	Not publish	**Possibilities:** **Risks:** May be damaged	**Possibilities:** Easier to get funding via SV **Risks:** Harder to get external funding	**Possibilities:** Better merits from SV **Risks:** Fever paper No paper published	**Possibilities:** Accommodating **Risks:** Weak, non-independent
	Exclude the Supervisor(SV)	**Possibilities:** - **Risks:** Lose contact	**Possibilities:** Maybe easier to get external funding **Risks:** No more funding via SV	**Possibilities:** You get the paper published **Risks:** Bad credits from SV	**Possibilities:** Independent honest **Risks:** disobey rules Selfish
	Include Supervisor(SV)	**Possibilities:** Good avoidance of conflict **Risks:**	**Possibilities:** Easier to get funding via SV **Risks:** No risks	**Possibilities:** Good credits from SV **Risks:** Takes credit from your work	**Possibilities:** Good at the department, accommodating **Risks:** Takes credit from your work Not factualistic

Questionnaire

OLE, HA, AT and EthXpert

1. Which tool did you use first after OLE?:
√ HA   AT   EthXpert

2. How good was the tool in identifying:
(Rate 1 to 5, 1=Bad, 5=Good)

	OLE	HA	AT	EthXpert
Stakeholders	2	2	2	4
Values/interests	3	4	4	3
Options/alternatives	4	2	4	3
Possibilities	2	3	3	3
Risks	2	2	2	3

3. Did it help you to:
(Rate 1 to 5, 1=No, 5=Yes)

	OLE	HA	AT	EthXpert
Get a good overview?	5	4	5	3
Understand the problem?	4	3	4	3
Make a decision?	3	3	3	3
Get confidence with the decision made?	3	3	3	3
Explain and defend the decision?	3	4	4	4
Get prepared for dialog?	4	4	4	4

4. How do you feel about the tool:
(Rate 1 to 5, 1=No, 5=Yes)

	OLE	HA	AT	EthXpert
Does it work?	3	4	4	4
Do you understand how to use it?	3	4	3	4
Is it easy to use?	3	3	3	3
Does it support achievement of your goals?	2	3	3	4
Does it help you make a morally better decision?	3	4	4	3

TOOLS EVALUATION

In solving our dilemma, we ranked the method based on the level of helpfulness for us in making decision. From our point of view, AT was the easiest method followed by EthXpert, OLE and finally HA. Following are our evaluation for all methods, respectively.

OLE - Compared with other evaluation tools, the OLE method is much more general. It enlightens people to think about the ethical problem more than to solve the problem. The questions in the OLE tool are all quite good for the beginners of the project to open their mind to think about the possible risk in their project. Some of them are also raised by other method in a more detailed way, which is very helpful for people to address the ethical problems and make ethical decisions. However, compared with other methods, the OLE tool is not so clear and straightforward.

HA - We found the tool to be fairly helpful. Particularly the lower and upper left as well as the upper right brackets were of value, as these made we think in a more structured way about the issue. The last field (Possible actions) was somewhat less helpful. Listing the possible actions was a good thing, but this is also the part that was already very clear at the start of the process, and so not much new came from it.

AT - The tool of AT which we used to analyse the dilemma is quite useful for us to think clearly about the whole issue. Most of the time it can give us a logical thinking structure to discuss the moral dilemma issues. Using the AT tool we can specify the reasonable alternative actions to solve the problem. And then the involved parts in the dilemma could be effected by different actions are listed. Through discussing the possibility and risk we can clearly see how to deal with the dilemma. There are some good results will be got through the whole procedure, however most time the results we got are not so useful to help us make the final decision. It only shows us various possibilities in different conditions. So we think that it is really a good and helpful tool to help people to analyse the dilemma issue.

EthXpert - In principle, EthXpert is a programmed tool in making decision for ethics problems. This tool is a mapping system for moral and ethic which can provide some proper guideline more likely to AT method. So in our case that involved a problem between student and his supervisor, we can use this method to analyze the problem and it consequences. For us who are coming from engineering background we found that this tool is not 100 % helpful and quite difficult to use and understand. However for someone who can really understand the psychology they will find this tool is very useful to help them in making ethical decision.

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