



ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

March 1, 2013



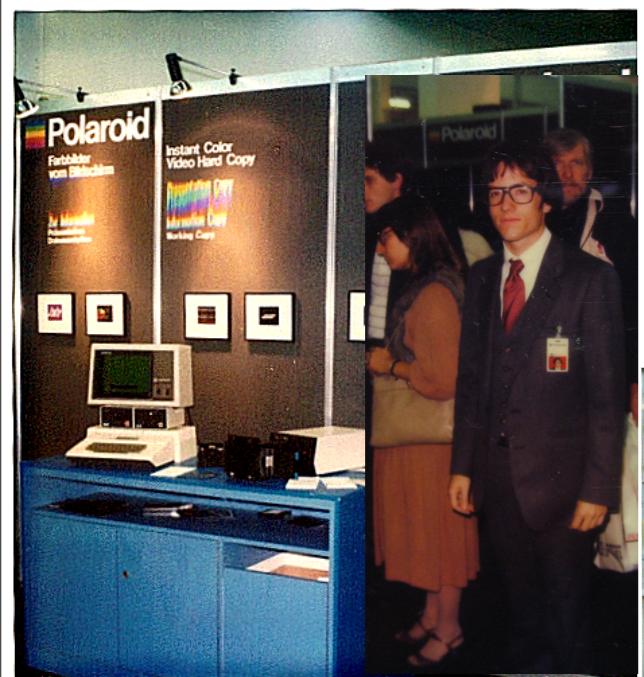
Bill Freeman

Associate Department Head

Electrical Engineering and Computer Science

Massachusetts Institute of Technology

Pictorial display of my own background.



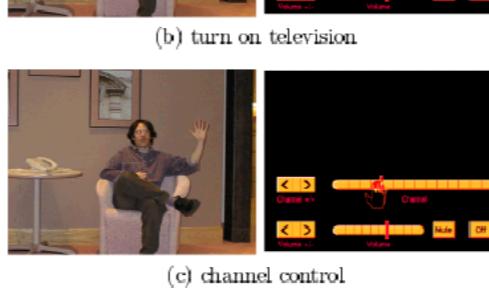
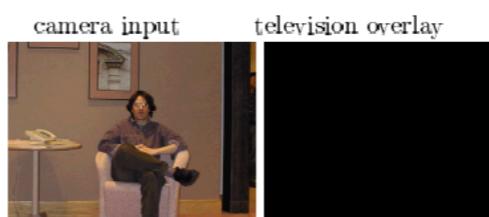
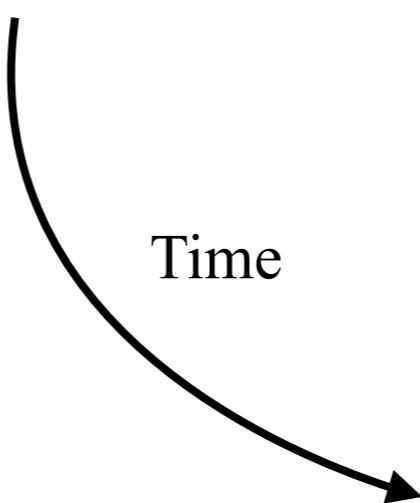
Polaroid 1981-1987



China 1987-1988



PhD 1988-1992



MERL 1992-2001



MIT 2001-present

Elements of a successful graduate career

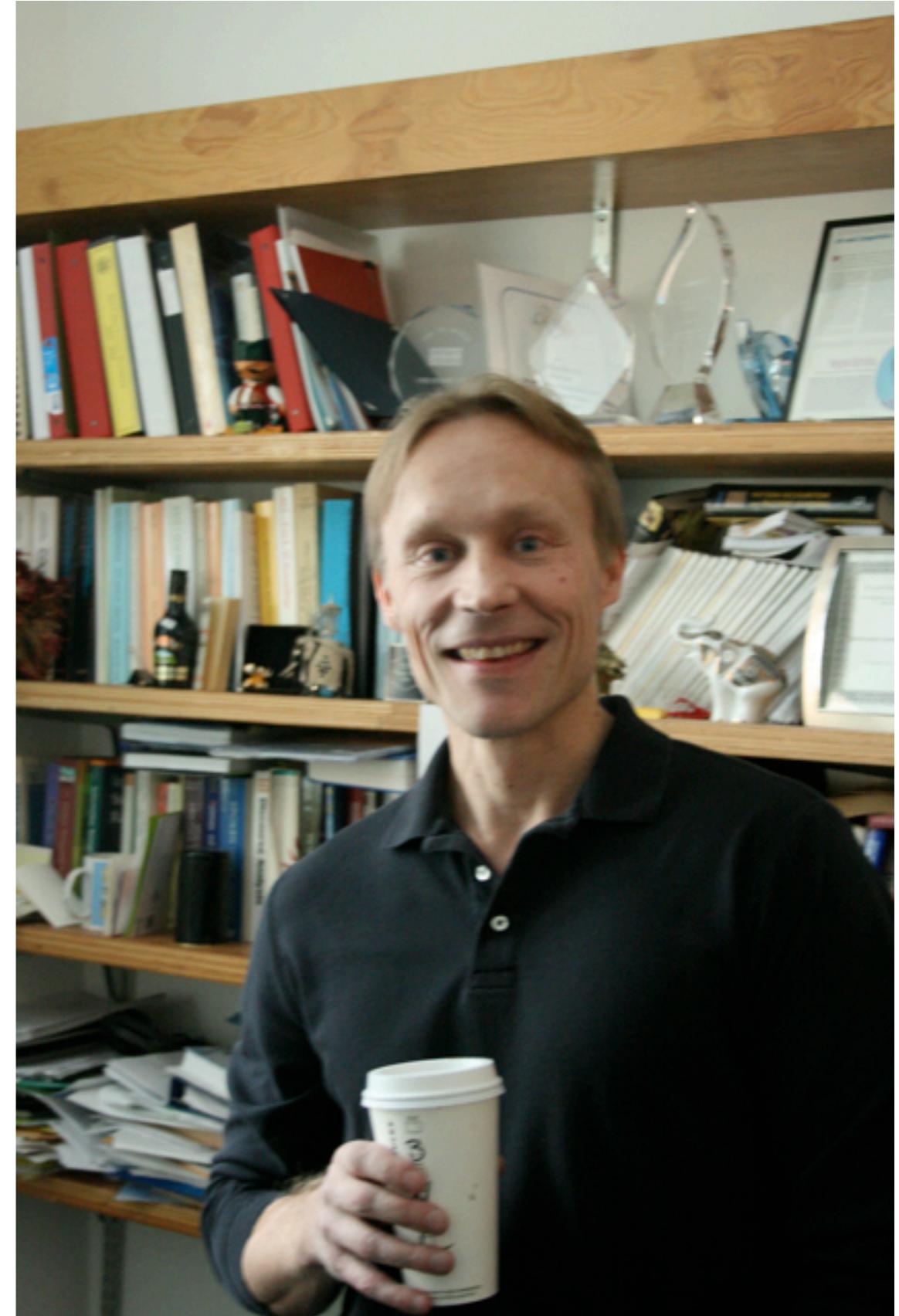
I crowd-sourced the rest of this talk. I sent this e-mail to the MIT Computer Science faculty and other CSAIL researchers:

Could each of you please send me what you think is the most important quality for success in graduate school?

Following are the answers I got back.

Desired qualities

The most important qualities:
curiosity and creativity



Tommi Jaakkola

Here are my desired qualities:

Determination, curiosity and flexibility, willingness to work hard,

try not to be ruled by fear...



Shafi Goldwasser

You want to be a marathon runner, not a sprinter.

(Not necessarily just the good, quick answers, as in a class. Want to be able to come up with the more thoughtful answers, too).



Brian Williams

David Karger



Purposefulness.

You are in grad school for a purpose (whatever your purpose is) and it is up to you see that purpose accomplished. Now, when nobody's telling you what to do, you have to tell yourself.



Total fascination with an area of science coupled with drive and imagination!

Dave Gifford



Jack Dennis

My first thoughts are: persistence, courage, flexibility
My choice for most important: persistence.

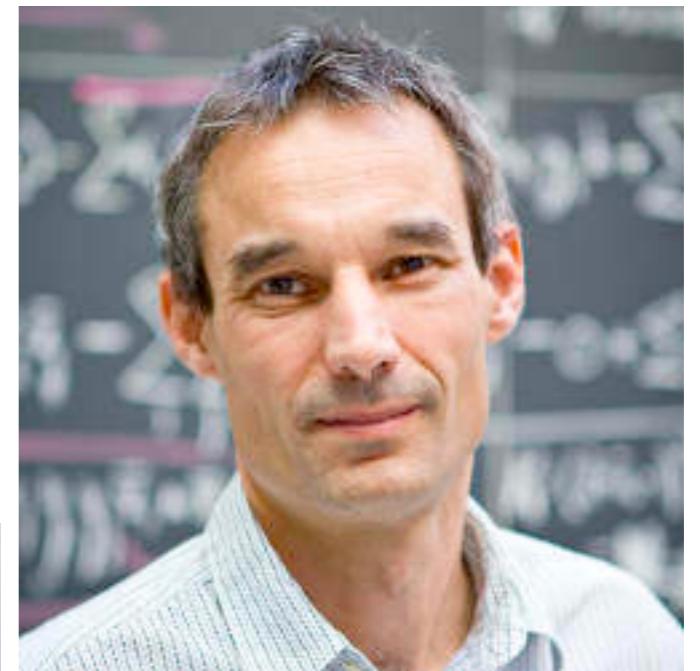
Pete Szolovits



Enthusiasm, curiosity, lots of energy, and scholarship. Being smart also helps, but admissions has already taken care of that.

Advice

Enjoy the freedom you have in graduate school to be creative



Frans Kaashoek



Figure out what you love, and do it (since you are going to be doing it for a while).

If you cannot figure out that there is something that you actually want to do, you will drift, lose your way and fail.

Dave Clark





Srini Devadas

The most important criterion is to "explore (and embrace) things you don't understand, as opposed to avoiding things you don't understand."



Take what you are good at and grow it.

Aude Oliva

“They didn’t know it was impossible, so they did it.” Too many students think it isn’t possible to do something, so what stops them is themselves. Once they unlock what was stopping them, nothing is impossible.



I think the most important thing in research is a story -- not a theorem or an algorithm -- but the story that makes the theorem or algorithm interesting and exciting. It's important to have an "ear" for a good story... when do the stories make sense, when are they bogus?



Tomas Lozano-Perez

The advisor



The best students are possessed by a problem. They're independent. They teach their advisors. They don't do what they're told...they do something more interesting.

(But maybe that's a scary thing to tell new students....but it's true).

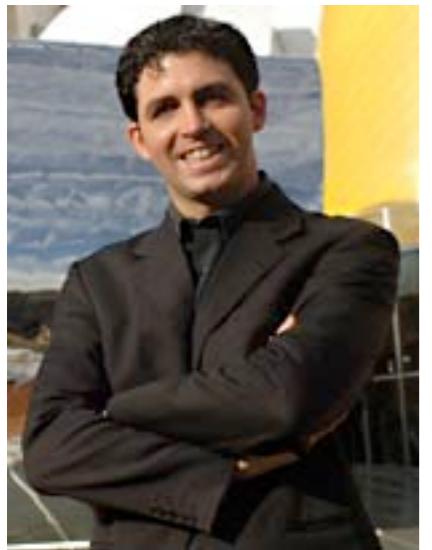


Leslie Kaelbling



Be more stubborn than
your advisor

Polina Golland

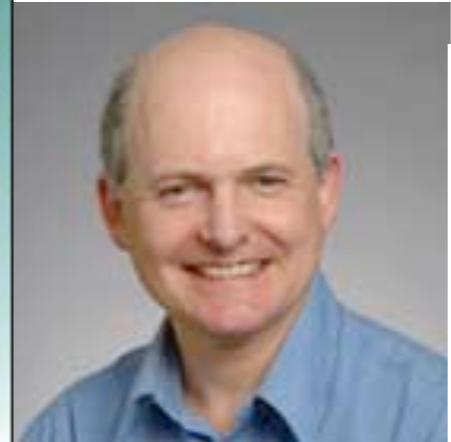


Don't tell your advisor you're doing what they advised against until you've solved the problem.

Manolis Kellis

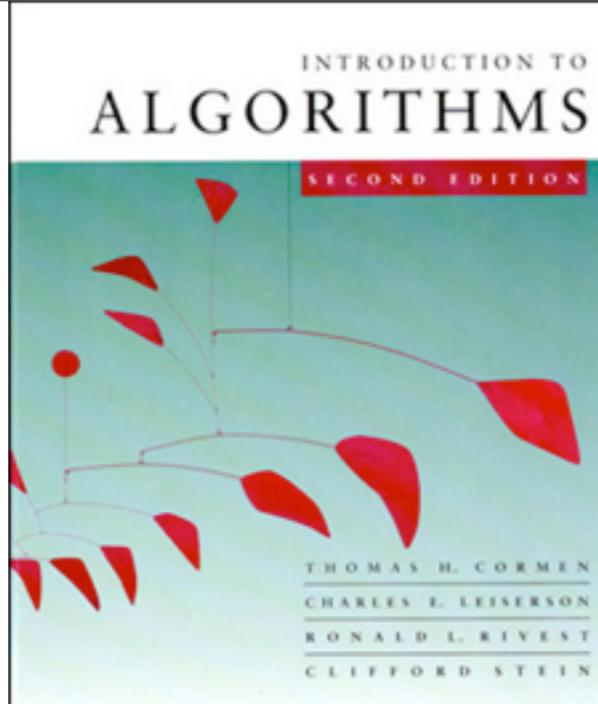


Charles Leiserson



Bill,

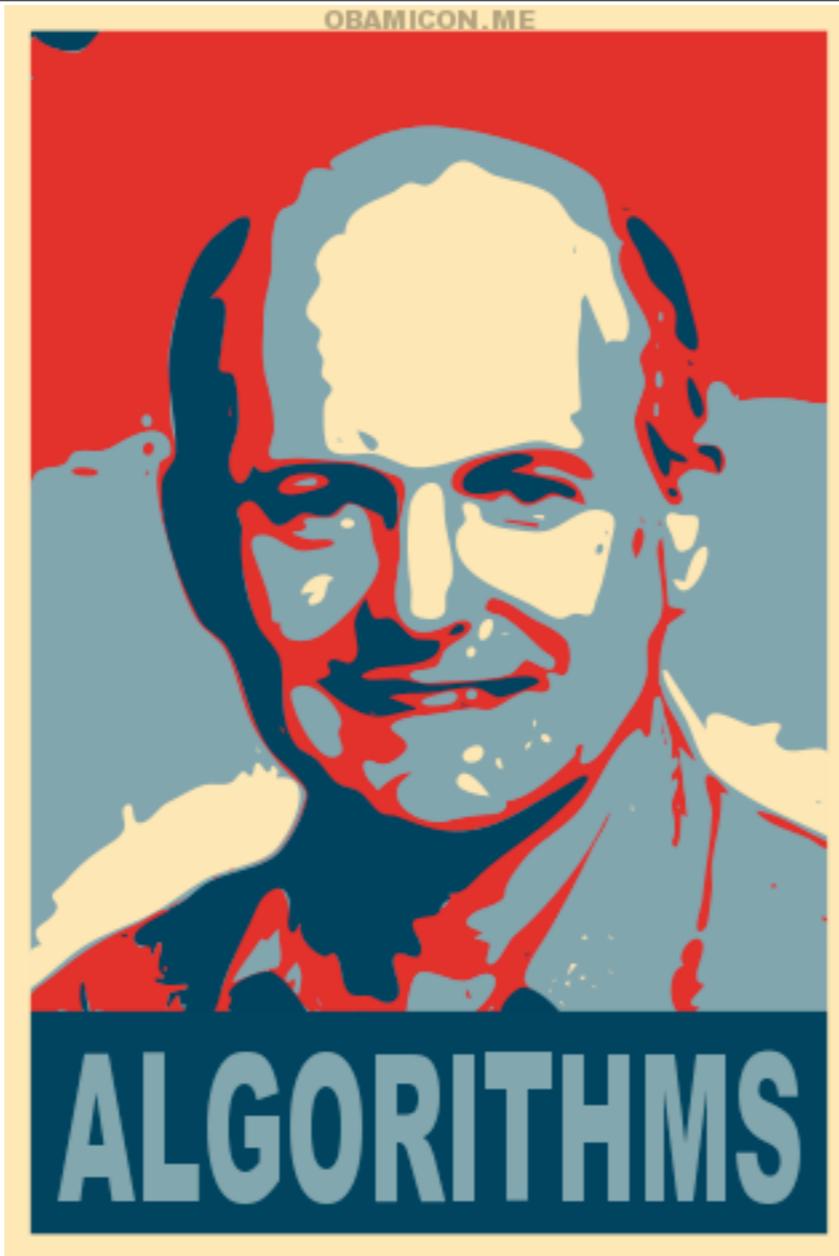
I'll tell you a joke instead.



A rabbit is caught by a wolf. The wolf is about to eat the rabbit, but the rabbit protests, "I'm only a few weeks away from defending my Ph.D. dissertation. I have worked so hard, and everyone tells me I have so much promise. It would be a shame to kill me when I have such a bright future of research contributions ahead of me that will benefit the world." The wolf says, "You're writing a Ph.D. dissertation? What is it on?" The rabbit replies, "It's entitled, *The Superiority of Rabbits over Foxes and Wolves*." The wolf says, "That's about the stupidest thing you could have said. I'll eat you right now." The rabbit says, "Wait, wait! Come to my den and read my thesis draft. If you don't agree with my conclusions, I will willingly give myself up to you." So, the wolf goes off with the rabbit to the rabbit's den ... and the wolf never comes out.

A few weeks later, the rabbit is caught by a fox. The fox is about to eat the rabbit, but the rabbit protests, "I'm only a few days away from defending my Ph.D. dissertation. I have worked so hard, and everyone tells me I have so much promise. It would be a shame to kill me when I have such a bright future of research contributions ahead of me that will benefit the world." The fox says, "You're writing a Ph.D. dissertation? What is it on?" The rabbit replies, "It's entitled, *The Superiority of Rabbits over Foxes and Wolves*." The fox says, "That's about the stupidest thing you could have said. I'll eat you right now." The rabbit says, "Wait, wait! Come to my den and read my thesis draft. If you don't agree with my conclusions, I will willingly give myself up to you." So, the fox goes off with the rabbit to the rabbit's den ... and the fox never comes out.

Charles Leiserson



A few weeks later, the rabbit is out and meets up with his old friend the muskrat. The muskrat says, "I hear you finally earned your Ph.D. Congratulations!" The rabbit says, "Yes, I just defended my Ph.D. thesis a few days ago." The muskrat asks, "What was your thesis topic?" The rabbit answers, *The Superiority of Rabbits over Foxes and Wolves.*" The muskrat says, "That's quite interesting. Can I read it?" The rabbit says, "Sure. Come to my den." They enter the den, and the muskrat sees the bones of foxes and wolves all over the floor. In the corner is a large lion.

Which brings us to the moral of the story: *More important than your thesis topic is who your advisor is.*



Maybe instead of "quality for success" (which sounds like it's just about the student), might be better to call them "ingredients" of success?

So here's an ingredient: a supportive advisor. Image attached [*next slide*].

Rob Miller

SON



I AM DISAPPOINT

Rules of thumb

Bill, I can offer a couple of rules:

#1: Listen to everything your advisor tells you

#2: Don't listen to anything your advisor tells you.

there may be a time-dependent alpha in front of rule 1 and (1-alpha) in front of rule 2.
As $t \rightarrow \infty$, $\alpha \rightarrow 0\dots$

#3: (Truly) the most important: believe in yourself and never stop persevering.

Una-May O'Reilly





Ruth Rosenholtz

- * Communicating with your advisor when things are not going well.
- * Good grad students need to be Renaissance men/women: program, experiment, come up with ideas, write, speak well.
- * Sometimes you have to cut your losses and work on something else. But otherwise, finish what you start. Persistence, but good judgment.



Daniel Jackson

- Be open: take lots of courses, talk to lots of people, attend seminars.
- Be focused: pick a small project first and get it done.
- Refine your message: at frequent intervals, rework your elevator pitch (and try it out on people who are _not_ in your research area)



Eat, sleep, and breathe a problem until you crack it.

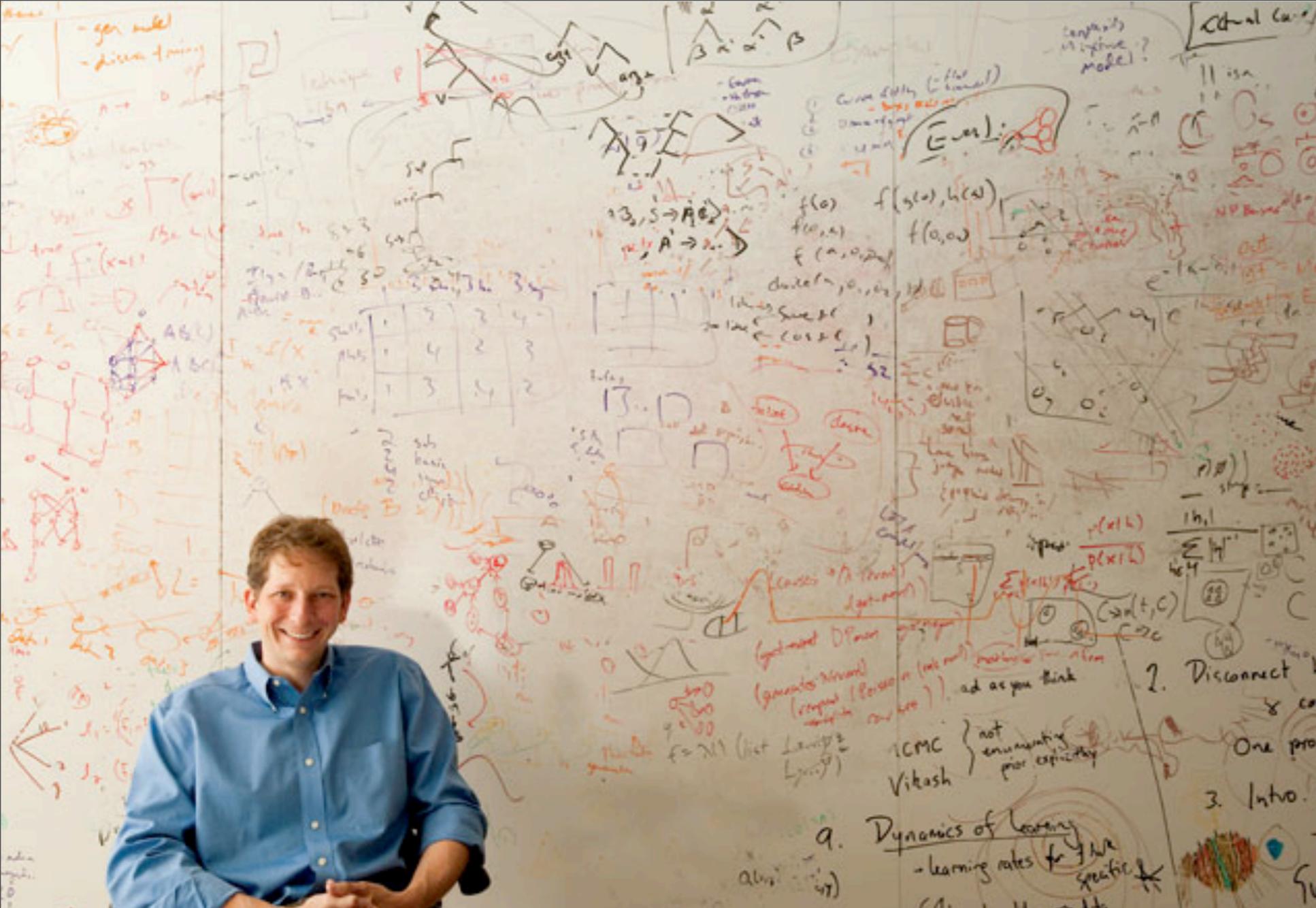
Put everything you have into your problem.

Become the world's foremost expert on your thesis topic.

Surpass your advisor.

Seth Teller





Josh Tenenbaum

(1) Don't waste time doing research you don't love.

(2) Don't waste time doing research that other people can do better than you can.

(3) Don't waste time doing research that other people in your field won't care about. (It's okay, and probably a good sign, if some people won't appreciate it, as long as enough people will.)

It's relatively common to find projects that satisfy two out of three of these criteria. But don't settle for your PhD: aim for all three!

Short



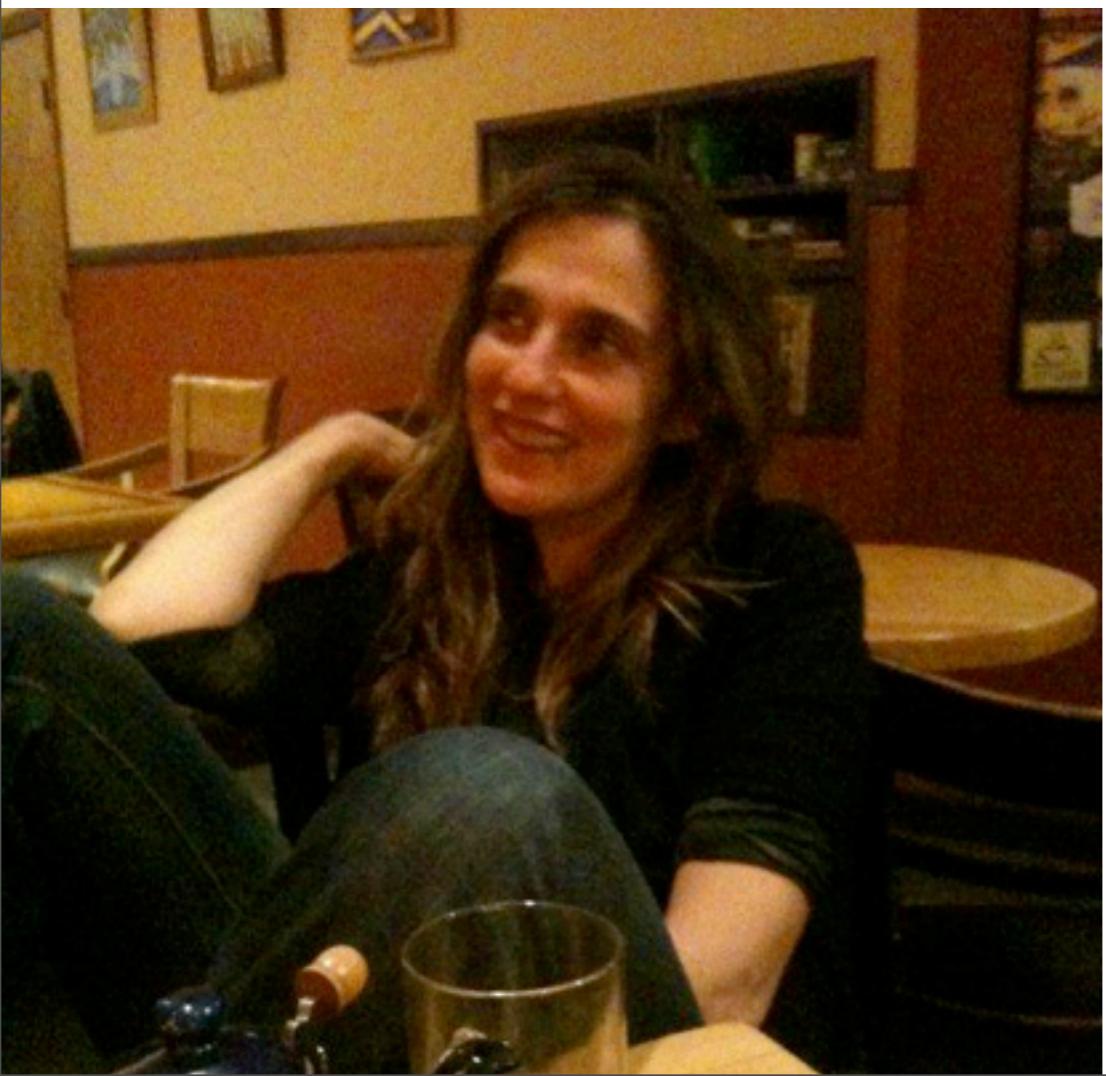
Writing and communication.

Taste



Fredo Durand

Being fearless



Regina Barzilay

Dr Stephanie Seneff



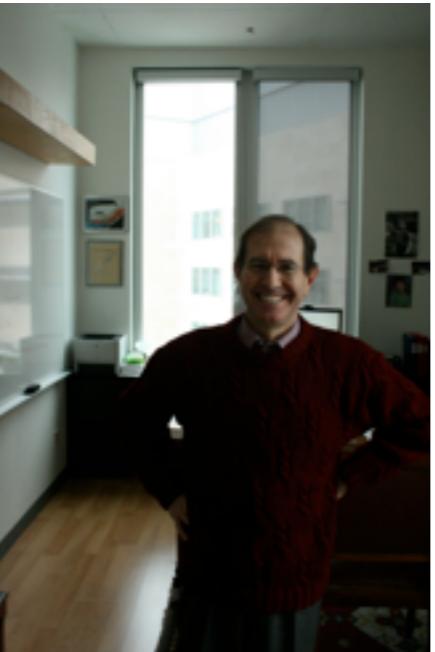
Passion! A passionate interest in the thesis topic.

Stephanie Seneff



Daniela Rus

The passion to pursue an idea
despite uncertainties.



Guts!



Silvio Micali



ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

“human clock” showing how my time in graduate school relates to yours. (My daughter at my PhD graduation, embarking for school, and embarking for semester abroad last year).

waiting for bus,
first day of school,
1996



MIT graduation,
1992



leaving for semester abroad in India, 2011



Welcome. Welcome to MIT,
welcome to Cambridge.

and, at a higher level, welcome
to research; welcome to a
community of people who are
passionate about what they do!