Thank you Nora and Roger for opening our meeting with such stimulating and wide-ranging presentations.

The chosen venue for the action coming out of this conference is college. I’d like to encourage the group to step back and consider the broader picture of higher education in America. Higher education across America is hurting. The underlying business model is under extreme stress. For decades, colleges and universities have been raising their price tags faster than the cost of living, faster than even the cost of medical care. These higher costs have been born largely through debt. The folks who have been paying the bills—state governments, parents, and the future-selves of students who take on debt—have become much less able or willing to continue to do so. At the same time, the value of a college education is coming into question. New college graduates are less employable and less employed than previous generations were at the same age, and far more burdened by debt. And again at the same time, the monopoly that traditional colleges have had as a source of advanced learning is also shaking, as young people with determination and an autodidactic bent figure out that they can learn from the resources of the Internet, either on their own or through the new-style MOOC’s—massive open online courses.

For the mission of this meeting, these facts on the ground have several important implications: Most obviously, there is a big problem, in that colleges and funders of programs at colleges don’t have much money to invest in innovation. But behind this problem, there is a great opportunity. Institutions of higher education that have been resting on their laurels and continuing with the same old ways of doing business, the same old programs and pedagogical models, are suddenly waking up and ready to try something new. I anticipate a shakeup coming in higher education, as we saw in housing and in journalism, with many programs and entire institutions closing. The ones that survive will be the ones that have some special or unique or characteristic value proposition to offer to their students, and to society. For some institutions, that special angle could be spatial thinking.

It is useful, as Roger has suggested, to assemble the strongest possible case for spatial thinking across the college curriculum, documenting, as Nora has done, that spatial thinking is both important and teachable. But as you do so, you should be aware that there is a lot of competition out there for the mindspace of undergraduates, and the attention and dollars of the higher education leaders. Just two days ago, I attended an NSF-funded conference on “Teaching Science through History & Philosophy of Science.” That group of articulate, concerned, intelligent individuals is seeking to expand the presence of history of science and philosophy of science in science education across grades K through 16, convinced that such a move would improve science education for all Americans. There are similar movements, probably with similar conferences, around the ideas of writing across the curriculum, quantitative skills across the college curriculum, and civic engagement across the college curriculum. Roger tells us:
“Every student should graduate with a working understanding of the theory & practice of spatial thinking.” How is the funder or college leader to prioritize this learning goal against the others clambering for attention, especially when it comes to the general education or liberal arts curriculum?

To my eye, the strongest case for an enhanced place in the undergraduate curriculum is being made for “critical thinking.” As documented in the book “Academically Adrift,” the Collegiate Learning Assessment has been used to assess all students across more than 100 universities, and found that 45% of them had no significant learning gains across the first two years of college in critical thinking and complex reasoning. This finding has caught the attention of college leaders, who are scrambling to find ways to move their students to the learning gain side of that sobering statistic.

So how can spatial thinking carve out a place for itself in this crowded marketplace of ideas? I see two options: specialization or alliance. The specialization option would be to focus on a few institutions that choose to deploy spatial thinking as part of their unique or characteristic audience appeal. At least one women’s college is interested in spatial thinking as part of a suite of educational innovations that they think will be especially attractive and beneficial to women, influenced by the research on gender differences in spatial performance. Some institutions could turn themselves into meccas for students who know ahead of time that they wish to build a career around their spatial talents. Such institutions could recruit their freshmen and placing their graduates around this specialization.

The alliance option would be to position spatial thinking as a facet of critical thinking, and join forces with the critical thinking folks. I think this is a case that can be made. The term “critical thinking” has become blurry around the edges, but at its heart it means the ability to assemble a line of reasoning to build a claim from evidence, and the ability to critique or evaluate such claims as made by others. Spatial information can be a powerful form of evidence, and spatial reasoning can be an effective form of reasoning for addressing important kinds of questions and problems. It is not currently featured in the Collegiate Learning Assessment—but it could be.

One of the reasons that I think the “critical thinking” folks are out in front of the competition for new space in the undergraduate curriculum is that they have a good assessment, and they have deployed that assessment across entire undergraduate student bodies. Moreover, their assessment addresses skills that most educated adults would recognize as important in adult life. Although spatial thinking has numerous instruments, the tendency has been towards context-independent instruments to get the purest possible measure of spatial abilities. The connection to life skills and STEM careers traced by Nora is indirect and correlational. Wedging spatial thinking into the undergraduate curriculum in a robust way will require tacking in exactly the opposite direction on the question of assessment: developing and deploying assessments that are obviously, even to the most skeptical eye, relevant to workforce skills and important problems of adult life.

I’ve mentioned my opinion that at least some parts of traditional higher education is heading for hard times and a big shake-up. Rather than, or in addition to, working with the most stressed parts of the system, it could be worth seeking out educational models that are thriving amid the creative destruction of higher education. One such place to consider looking is the tutoring/self-
help industry. Parents pay handsomely, outside the formal education system, to give their children any edge that will help them get ahead in the increasingly cut-throat competition to reach the up-escalator in the 21st century economy. Spatial thinking could be such an edge. If you don’t want to go there yourself, perhaps you could pass along this suggestion to an unemployed or underemployed recent PhD recipient. Another model to consider would be a MOOC, or massive open online course. Imagine 1,000, or 10,000 or 100,000 students, around the world, enrolled in an online course to improve their spatial thinking. From a research perspective, imagine 1,000 or 10,000 or a 100,000 spatial assessments flowing into your computer system, along with metadata on the respondents’ gender, nationality, and age. Imagine a chance to try an intervention on half of those students, and see if the intervention group improves more than the non-intervention group. From a save-the-world perspective, imagine 10,000 or 100,000 students returning to face the problems of their lives and their societies with the extra edge of spatial thinking in their tool boxes.

So it’s a tough world out there, with lots of tough problems. But that’s exactly why you should persist. In these tough times, humanity needs every tool at our disposal that can help solve tough problems and answer knotty questions. Spatial thinking is one of those tools. Make big plans—and carry them out. Learning transforms lives.