
Task Force Meeting

of

NEW JERSEY BIOTECHNOLOGY TASK FORCE

*“The Task Force will hear testimony
from Susan Windham-Bannister, Ph.D.”*

LOCATION: 36 West State Street
Trenton, New Jersey

DATE: April 3, 2018
10:00 a.m.

MEMBERS OF TASK FORCE PRESENT:

Debbie Hart, Chair
Assemblyman Andrew Zwicker, Vice Chair
Senator Robert W. Singer
Assemblyman Gary S. Schaer
Assemblyman Christopher P. DePhillips
Timothy J. Lizura
Daniel J. O’Connor, Esq.



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DEBBIE HART (Chair): Hello, and welcome; and thanks, everyone, for being here.

Hello, Senator; we didn't officially say "hello" yet. It's good to see you.

So I'd like to thank you all for coming, especially since we've moved this at least once due to snow, right? We're all happy to be here.

I'd like to thank the EDA for hosting us this morning; and being just a tremendous partner in this whole process.

Thank you to Tim and your team; it's been extraordinary--

MR. LIZURA: Happy to host.

MS. HART: --as usual, working with you.

Also the Office of Legislative Services, who has supported us along the way, as well.

I'd like to thank the members of the Task Force. We appreciate the time and attention that you all have given to this, given your day jobs and other jobs down the street. So thank you, thank you.

You know, we're happy to be here this morning. We have some really important discussions and some important work ahead of us, and a really interesting agenda. I think when you hear from our speaker, you'll know why I say that.

And so before we get started, I'd like to ask our Task Force to just say hello.

Our Vice Chair, Assemblyman Zwicker; please.

ASSEMBLYMAN ANDREW ZWICKER (Vice Chair):
Sure.

Good morning.

My name is Andrew Zwicker; I'm the Chair of the newly formed Science, Innovation, and Technology Committee in the General Assembly. And I'm a physicist at Princeton University.

MS. HART: Senator Singer.

SENATOR SINGER: I don't hold it against you for Princeton.

(laughter)

ASSEMBLYMAN ZWICKER: Can't do anything about it.

SENATOR SINGER: Good morning; I'm excited about being here.

You know, the Assemblyman and I are busy doing some things I think the Commission should just know about in general. We're working on reintroducing, with Senator Sarlo, the Commission on Science and Technology; reestablishing it. That Bill will be fast-tracked, hopefully; we're talking about \$25 million to start. We're at-- When I was on it before -- and it's been-- Bipartisan Governors raided it and destroyed it.

But I think that's a key factor in this whole thing; that Commission really led the way in helping the incubators and working with that. And then, of course, we're talking about all the things, again, legislatively, to help go forward with this entire thing.

So I'm glad to be here today; and I thank Debbie and the group for having me.

MS. HART: Okay; Tim.

MR. LIZURA: Good morning.

On behalf of the Economic Development Authority, welcome to our headquarters. Now you've seen two of our facilities in the state, having hosted the event at our CCIT for the last two conversations.

Thank you, really for everybody's participation. We have been thrilled to be part of this conversation. On behalf of the staff -- Maureen, and her team Lenzie, Kathleen, and really the group who is doing the scholarship behind putting some of the thinking behind the final report -- we're pleased to be a part of it for sure.

OLS, thank you for your cooperation in coming to all the different locations as well.

And we look forward to continuing to engage.

MS. HART: Thank you.

Assemblyman DePhillips.

ASSEMBLYMAN DePHILLIPS: Good morning; I'm Chris DePhillips. It was nice to meet you earlier.

I represent the Assembly, in District 40, which is a northern -- one of the northernmost districts in the state. I've been in the Assembly, now, for three months; so I am still a relatively new member.

I also am General Counsel and Vice President of Administration at a life sciences consulting firm; so that's my day job. And so I'm thrilled to be on the Biotechnology Task Force because it's right up my alley. And our firm actually has an office in Massachusetts, as I mentioned, so I am very much looking forward to your testimony today and what you can tell us about the Massachusetts experience, and how you can educate us on where we go forward here in New Jersey.

So thank you for being here.

MS. HART: Okay, thank you; thank you so much.

Okay. So, we're at a really interesting time in New Jersey. It's a little serendipitous. And Sue, your timing of coming here is, I think, really important -- as we're looking at all of the things that New Jersey has and some of the opportunities to create new. We have a new Governor, who is so committed, as we've heard, to innovation. He's really put some stakes in the ground early, already, in his tenure, so we're excited at the possibilities and the opportunities there.

Tim Sullivan comes to the EDA really hitting the ground running, given his tremendous history and time in Connecticut and New York. So we're excited at what he will do. And I'm sure by now he realizes that he is working

with *the* strongest team in State government, I think, anywhere, here at the EDA. We very much look forward to working with Tim.

And then also, the other sort of serendipitous thing -- but not by happenstance -- Assemblyman Zwicker is chairing the Assembly Science, Innovation, and Technology Committee. And you've had some hearings already, and there is some interesting work going on there. Would you like to just tell us about it?

ASSEMBLYMAN ZWICKER: Sure.

And as Debbie mentioned, the new Governor -- he campaigned on a big part of this idea of this innovation economy. And I think we're here today to hear from you, in part, because we know that Massachusetts has been a leader, now, for quite some time; and it's been through, to no small part, your efforts.

SUSAN WINDHAM - BANNISTER, Ph.D.: Thank you.

ASSEMBLYMAN ZWICKER: And if flattery is the best form of imitation, we're here to try to steal your business. (laughter)

DR. WINDHAM-BANNISTER: I get it. (laughter)

ASSEMBLYMAN ZWICKER: But we are here to learn from the best practices, because you are about to show us, really, you know, not just what Massachusetts set out to do but, of course, what you've accomplished; and have become, as you know better than anybody, a national leader.

New Jersey -- we have this wonderful location; we have the highest density of scientists and engineers in the world; I'd say in the universe. I would also follow that up saying we have the highest density of many things; so be it.

But we should be in that same conversation with Massachusetts, or California, or North Carolina, or New York, or -- etc., etc., etc.

So the Speaker of the General Assembly, Craig Coughlin -- one of the first things he did was create a Committee that other states have had; it's a

standing Committee -- the first one that has been created in several years -- Science, Innovation, and Technology.

We started off by looking at some larger Federal issues; but as we just get off the ground, I am, I guess, the senior member of the Assembly. I've been in for a grand total of two years. (laughter)

But the real focus of the Committee is around innovation as an economic driver, right? And so as Senator Singer has already mentioned, we had, for years, a Commission that was a central hub for the State --which is really critical -- where private, public, and academic institutions could all come together; and it would both invest and promote. That went away over -- slowly, over the course of a bunch of years. And so one of the first things that the Committee is doing is reinvigorating that. And as the Senator mentioned, there's strong bipartisan support for that. I mean, science has no political party; we know that.

So it's really a pleasure. You know, I have to end by thanking Debbie for her leadership now; not just on this Task Force, but for the life sciences for quite a long time.

And as you said, you know, the pieces are here. And so now the goal is really to coalesce around this momentum. And your leadership has really been a catalyst for that; so thank you.

I'm looking forward very much to hearing what you have to say.

DR. WINDHAM-BANNISTER: Thank you; thank you.

MS. HART: Thank you; thank you, Assemblyman. It's a labor of love, as everyone knows.

And another one of our Task Force members has joined us; Assemblyman Gary Schaer is here. And we would love to -- when you get settled, love to invite you to just say hello.

Name, rank, serial number, please, sir. (laughter)

No; we're happy to have you here.

ASSEMBLYMAN SCHAER: You're very kind.

And my apologies for being a little bit late. The Turnpike was a little bit longer than we had anticipated.

But just to follow what Assemblyman Zwicker has said -- and I'm sure everyone else -- to echo those feelings about the amount of the work that has already been invested, in and the extraordinary importance of everything that will take place in going forward.

So I thank you as well for your leadership, and your assistance, and your guidance.

MS. HART: Thank you for being with us.

And so, with that, we're going to move into our program.

So our speaker actually knows a little bit about New Jersey; and Trenton, specifically, because her mom grew up here.

So welcome back--

DR. WINDHAM-BANNISTER: Thank you.

MS. HART: --right?

So Dr. Susan Windham-Bannister is the President and CEO of Biomedical Growth Strategies, LLC. Dr. Windham-Bannister's unique perspectives draw on her previous experience as President and CEO of the Massachusetts Life Sciences Center, a state-funded investment organization, and the hub for all sectors of the Commonwealth's life sciences community.

So we all know of the legendary success of the Massachusetts sector, which continues to astonish and amaze us. And you know, frankly, Sue, as Assemblyman Zwicker said, we'd love to hear more about that; we'd like to, perhaps, borrow some of your ideas--

ASSEMBLYMAN ZWICKER: That's a better word. (laughter)

MS. HART: --learn some lessons; and really, we'd like to hear your thoughts on how we might proceed.

So, Sue, the floor is yours.

DR. WINDHAM-BANNISTER: Thank you.

MS. HART: Thank you.

DR. WINDHAM-BANNISTER: Thank you, thank you.

Well, thank you--

Can everyone hear me?

ALL: Yes.

DR. WINDHAM-BANNISTER: All right.

Thank you for having me.

And as Debbie mentioned, my mother and her four siblings grew up here in Trenton; so I have come to Trenton quite a lot. My grandmother, at the age of 86, left Trenton and moved to St. Louis; which is where my mother and we were living at that time. But this *Trenton Takes, The World Makes* -- so many things very, very familiar to me; things I have heard.

And my mother died about three weeks ago, at the age of 95. And she knew that I was coming to Trenton, and she was really excited about it. So really, for very personal reasons, it's a pleasure to be here; and I thank you very much for inviting me.

A couple of things: This is not a commercial about Massachusetts. I'm really here to discuss with you; and so in that spirit, I invite your questions, your comments throughout my presentation.

But I'm really here to discuss with you how Massachusetts went about thinking about innovation, and building and strengthening our ability to have a bigger part of our economy driven by innovation and life sciences; innovation in particular.

I'm going to talk a little bit about what is the Massachusetts initiative -- how did we structure this; and what metrics have we used to determine our success and to monitor the success.

So I'm going to spend less time talking about exactly what the numbers look like, and more about these metrics; what are we tracking? And then finally, how do we execute?

Again, there are leave-behinds; what I have done is to take these two presentations and kind of synthesize them, so there are actually more slides available to you than I'm going to show. And I'm not going to talk about every slide in detail because, again, my goal is to finish, leave you at least 15 minutes to talk about next steps; but really, to talk *with* you and not *at* you.

Before we start, let me say a little bit about terminology. As I use the word *innovation*, it really refers to the entire process of bringing new science, new technology, new ideas out of a phase of discovery or invention, if you will, into commercialization. I really have not run across any colleagues around the state, around the country, around the world who aren't thinking about innovation as a way of driving their economy. And it is really the case that you don't really -- you don't get the full economic benefit until you have moved your good ideas into execution and application.

So when I'm talking about *innovation*, I know some people talk about innovation in the lab, etc. But I'm really talking about innovation as the entire process of bringing new ideas into application, into the market; services and products which have value and for which people will pay.

Also -- is this clear; is this out of focus? Okay.

Entrepreneurship -- likewise. It really is the full process involved in starting a business. So I'm talking not just about a culture of entrepreneurship; but the availability of human capital, of investment capital, of connections, support systems, and places to grow new businesses.

And finally, an innovation ecosystem which is, perhaps, the most important ingredient in building and sustaining an innovation-driven economy. Many of us look at our assets, and we like to talk about them: our universities-- And one of my best friends from childhood went to Douglass, so

I'm dating myself -- to Rutgers; another very good friend went to Princeton. So I am very well aware of all the fine universities here in New Jersey.

We talk about our medical centers; we talk about our companies, and our faculty, and our students. But that's a *cluster*; and an ecosystem is very different, and I'll talk about that as well.

So with that context, let's get started.

I would submit to you that when you are starting to think about innovation-driven economic development, what you really are thinking about is building what innovation economists call *innovation capacity*. It's a skill, it's a competency; it's the ability to produce and commercialize new technology, products, and services over the long-term -- meaning, you can do it over, and over, and over again. It isn't a one-off; it isn't a, "Well, you know, in 2000, we did this." It is something that you can do over and over again, because all the pieces that are necessary are there.

Innovation is a process; it has a life cycle; it moves from creation, through development, growth, and sustainability. It sits on a platform. There are certain things that need to be there to support the innovation life cycle. And so really trying to increase the scale of an innovation-driven economy and building innovation capacity is about being very clear on what your strengths are along that supporting platform, along that life cycle, and what the weaknesses are; and investing very intentionally to sustain those strengths and to fill in those gaps.

I think, but, for your purposes, as a Task Force, when you build innovation capacity you really are addressing the goals of your innovation initiative. You strengthen the platform, and all of your stakeholders benefit. And I think, more importantly, what innovation economists tell us about geographies that have high innovation capacity is that they develop faster economically; they attract a highly skilled, and retain a highly skilled

population; and they experience rising incomes and trade. So I think all of these are probably very consistent with what you're trying to accomplish.

I will say for me, as well, as someone who has always worked in this space, I'm happy to come and share, because not only do I understand that the global economy is an innovation economy, and so we need to do this economically; but patients need this. Patients need as many high-performing, high-innovation capacity areas as we can create because this is the source of new therapies, and new drugs, and treatments and, hopefully, cures.

Now, states with low innovation capacity underleverage their research investments; and certainly, sitting in a state that has great academic institutions -- and is the hub, if you will, of Big Pharma -- there is a lot of research that goes on here. Now, the good news is that when you look at the total U.S., where the ratio of research dollars -- at least from the public sector -- to the ratio of venture capital, which is the proxy that Pricewaterhouse uses as a measure for the extent to which you are commercializing your research -- you are performing above the national average. But I would compare you with Massachusetts and California, where you see the potential to really leverage those research dollars with over a dollar on the dollar.

Yes?

ASSEMBLYMAN ZWICKER: So can I get some detail -- just a little more detail on this slide?

DR. WINDHAM-BANNISTER: Of course.

ASSEMBLYMAN ZWICKER: Is it, for instance, the ratio of private VC specifically into the life sciences?

DR. WINDHAM-BANNISTER: Yes, yes.

ASSEMBLYMAN ZWICKER: Okay.

DR. WINDHAM-BANNISTER: This particular chart.

ASSEMBLYMAN ZWICKER: Right; so it is there.

DR. WINDHAM-BANNISTER: Yes; PricewaterhouseCooper, every year, in their MoneyTree report--

ASSEMBLYMAN ZWICKER: Got it.

DR. WINDHAM-BANNISTER: --looks at how many Federal research dollars from NIH -- the biggest source of those dollars --

ASSEMBLYMAN ZWICKER: Sure.

DR. WINDHAM-BANNISTER: --there is NSF; there are other sources -- flows into a state.

ASSEMBLYMAN ZWICKER: And then my other question is, do you know -- off the top of your head, how many medical schools are in Massachusetts?

DR. WINDHAM-BANNISTER: There are Tufts, BU, Harvard, University of Massachusetts. I think there are four.

ASSEMBLYMAN ZWICKER: Thanks.

DR. WINDHAM-BANNISTER: But still in all-- Now, you might - - this may surprise you: this number, New York. In 2014, New York was 7 cents of VC money on the dollar. And it was really this number that motivated the Partnership for New York City to say, "What the heck? We need to take a look at this and see what is going on;" because, of course, they have many, many world-class research institutions.

I thought, again, just looking at a sister state, what's the upside? So you saw that, in 2014, as I said to you, New York was getting 5 cents of venture money for every dollar of money from the Federal government for research. And KPMG did an estimate and said that if the commercial activity, even in downstate New York -- which is where the majority of the academic institutions are -- was on par with its NIH funding, they would be looking at an additional 18,000 to 25,000 jobs, and between \$2 billion and \$3 billion of additional economic growth. So again, you see here, very simply, the economic value of being able to translate your research here. New York

exports a tremendous amount of technology; they out-license it from the universities, and it goes elsewhere to be commercialized.

So how do you build innovation capacity? There are really five key enablers.

Translational scientific research. What is the culture regarding applied research, versus basic science and basic research? I'm not saying that one is better than the other; but I will say that in many, many academic institutions -- and Massachusetts looked that way as well, in 2008, with the exception of MIT -- the faculty was very, very focused on basic science, contributing to knowledge; as opposed to thinking about the application of their research. And they were preparing students primarily to go into academic tracks, as opposed to thinking about industry, as opposed to thinking about starting companies.

So if this is a starting point -- it's not the only one, obviously -- but how strong is this, as an engine? What is the culture, what is the capital, what's the attitude towards entrepreneurship?

In Massachusetts, our economy, heretofore, was based on financial institutions; it was based on intellectual capital, health care, obviously; and education. Whaling -- not what it used to be; so that was falling off of the radar screen. (laughter) It was a very risk-averse culture. And the notion of starting companies, and failing, and maybe succeeding --but failing and failing again -- was really not embraced, it was not rewarded in Massachusetts. So we really didn't have a very strong entrepreneurial culture.

So what message are we sending about how much we value people who take risks? And certainly, in many geographies that are driven by big industry, Big Pharma, the mindset is you go, you get on the treadmill, and you kind of work your way up. And maybe there's less of an emphasis placed on starting new things, and trying and failing.

Workforce development and job growth -- the third pillar, the third enabler, if you will. Not just research talent, but talent that knows how to grow young companies, knows how to take risks and how to grow companies. Enabling infrastructure, commercial lab space, incubators, business accelerators, state-of-the-art research facilities, places where innovators and entrepreneurs can meet each other and spend time, technology, connectivity -- all of those are enabling infrastructure.

For us in Massachusetts, the key enabling infrastructure is beginning to be our transportation system; which is woefully outdated and is having a big impact on our ability to support our innovation economy.

And last, but not least, this notion of an ecosystem -- which is, how well do all the players work together? Do they see themselves as a community? Do they see themselves as a system? Are they committed, not only to their individual success, but to their collective success? Very, very important.

Let me just say to you, as you begin your work, a reminder: Thinking about setting priorities for targeting investments, you really are thinking about the optimal bundle that will really move you further into building your innovation capacity.

Really quickly, though -- I want to come back to this, because it's so important, and remind you a cluster is a reflection of your assets. And you know, Michael Porter talked a lot about clusters, as far as economic development. But when you have an ecosystem, all of those assets work together. And it really is the case that one plus one equals 11. This is where you get your leverage. And I will tell you that when investors look at where they want to invest in young companies, they pay a lot of attention to the ecosystem. Because it really says that there is a support system that will enable these younger companies to thrive; and they will very often move

companies in search of stronger ecosystems. So it plays a big part in what we call *attractiveness to capital*.

How do you build an ecosystem; or what are some things to think about in building an ecosystem, since it is so important?

Shared aspiration and vision: That was something that we have worked very hard on in Massachusetts -- that we are really thinking about ourselves now as a leader, as a community in the life sciences.

Advocacy and publicity: You know, are we talking about our life sciences community; are we advocating for it? Do we have a brand for it; do we market it?

Advisory and mentoring resources participate. A strong ecosystem has not only the scientific community and the business community, but the law firms, the advisory services firms; you know, the accounting firms. All realize -- the real estate developers -- everyone realizes that they have a role to play in that innovation economy, and they participate in the ecosystem. Is there alignment of the stakeholders on the core competencies and the value proposition? Do we agree on what we do well?

And finally, are there incentives to be part of the ecosystem? And this is something that we paid a lot of attention to in Massachusetts, and I'll talk about that in a minute.

So a framework for thinking about our work. I find that very often -- and I'm not implying that's the case here -- that when groups start these initiatives, they're very focused on the outcomes that they're hoping for; but there isn't an underlying strategy, there isn't a framework to say, "This is what we're really trying to do."

And so I -- I mean, I hope that thinking about this as building innovation capacity, which has enablers, is a way to continue to think about this issue, going forward.

Let me pause; any questions about framework or strategy? (no response)

So our strategy in Massachusetts was to really be laser-focused on what we did not have, as far as the enablers; and to invest very intentionally to fill those gaps. And as we built out that platform and made Massachusetts a place where innovation could find what it needed, we began to grow lots of young companies; and attract lots of companies, large and small.

What is the initiative? It began in 2008 -- it began in 2007, with a bold announcement by then-Governor Deval Patrick that Massachusetts was going to invest \$1 billion in the life sciences. Where did the number come from? We really don't know; he just sort of picked it. I think someone said to him, "You know, Governor, it takes a billion dollars to bring a new drug to market." And he said, "Okay; that sounds good. A billion dollars; that's it." (laughter)

But it was really pretty incredible, because he announced this in 2007; by 2008, he was signing it into law. The legislature came on board; the Senate President, the Speaker of the House really got together behind this and said, "Yes, we will do this. We'll make this commitment."

So it's a 10-year initiative. It began under a Democratic Governor, who really saw the state as an investor and a visionary. But it is going to be recapitalized by our current Governor, who is a Republican, but has been very clear that the data on the impact of this initiative has been so compelling that he has committed to recapitalize it at the same level for another five years. So it's very exciting, you know, to see this cross Administrations.

The initiative is administered by a quasi-public entity; it was my great honor to be the founding CEO, and so to build this from scratch. It is funded by the state, but it is governed by a Board of Directors. And we were able to invite the private sector to put money into various of our investment

funds. But all of the operating costs, and most of the programming, was really done with public money.

So this Center not only funds innovation; it is an innovator. It has worked on new roles for the public sector, to strengthen as a strategic investor -- so new ways to think about the role that the public sector plays; to develop some novel programs and financial tools; and to develop unique models of collaboration with the private sector.

Yes?

ASSEMBLYMAN ZWICKER: So was your budget, when you were CEO, \$100 million a year?

DR. WINDHAM-BANNISTER: Ideally. So let me tell you -- let me-- I will tell you that in one second.

ASSEMBLYMAN ZWICKER: Okay.

DR. WINDHAM-BANNISTER: Very quickly -- I think this is really part of the *secret sauce* in Massachusetts. The fact that rather than asking an existing entity to oversee the strategy, rather than asking a government agency, they created a new entity that was a neutral third party, who loved everyone. And whose job was to think 24/7 about this life sciences strategy, our ecosystem; to build it, to strengthen it, and to continue to invest in it. And you can see lots of stakeholders and lots of activities, which included marketing, and outreach, and driving the participation of the trade shows, and recruiting companies, etc. And so it was outbound and inbound activity.

A very multi-faceted initiative; it sat at the intersection of economic development policy, fiscal policy, healthcare policy -- because we were looking for lower cost ways of taking care of people -- and business strategy. And very broad goals: good science, good business, global leadership, commercialization, and economic development across the state.

ASSEMBLYMAN SCHAER: If I could ask you--

The one question -- and I took the liberty of going through the papers earlier.

DR. WINDHAM-BANNISTER: Yes.

ASSEMBLYMAN SCHAER: At what point is this an *evolution* versus an *imposition*?

DR. WINDHAM-BANNISTER: An *imposition*?

ASSEMBLYMAN SCHAER: An imposition -- in a positive way, by the way.

DR. WINDHAM-BANNISTER: Yes.

ASSEMBLYMAN SCHAER: At what point were all the various pieces there, and one took advantage of those pieces and brought them together, right? And at what point was it just, almost, evolutionary, in terms of the growth process?

DR. WINDHAM-BANNISTER: I think it's a combination of both. I think there's a tendency to think that everything in Massachusetts was there. But I have commented on the fact that we did have a strong applied research culture in our academic institutions. We did not have a culture that embraced entrepreneurship. We really had very modest capital; we did not have a lot of VC activity in Massachusetts at that time.

ASSEMBLYMAN SCHAER: Not to interrupt, but one of the things that seemed to come across very clearly was also there was not a lot of cooperation.

DR. WINDHAM-BANNISTER: No (laughter); absolutely.

The thing that I heard most often about Massachusetts is, "Smart people who don't play well together in the sandbox." So we did not have an ecosystem; we had very prominent, very arrogant, relatively self-sufficient players. A public university very hostile towards the private universities; MIT and Harvard not loving each other very much. We had all the issues that you might expect.

So I think that there were certain raw ingredients; but I think what this did was to impose, but also to encourage, and invite, and to use various incentives to bring this community together. And it is quite a wonderment the extent to which financial incentives can incite collaboration until that really becomes part of the culture.

So I think it was both. There were certainly a lot of raw ingredients, not the least of which was that Massachusetts really had a lot of very early activity in biotechnology.

But we did not have many, many, many of the ingredients. And, you know, we had lost our leadership in technology; young companies had left the state in droves. And so we kind of learned a lesson that we really were not an innovation-friendly environment; and that was certainly on the mind of the Governor, and the business community, and the legislature as they started this initiative.

Did you have a question?

Yes.

MS. HASSETT (EDA Staff): (off mike) Sue and I just discovered that we share an academic institution, which is nice; albeit 1972 and 1982 (laughter), which is lovely.

At that time, 1984, the Route 128 corridor was really--

DR. WINDHAM-BANNISTER: The Technology--

MS. HASSETT: --just starting to catch on; but it was really more on the tech side.

DR. WINDHAM-BANNISTER: Absolutely; and so--

MS. HASSETT: Okay.

DR. WINDHAM-BANNISTER: And so we had a lot of empty buildings--

MS. HASSETT: Yes.

DR. WINDHAM-BANNISTER: --after a while, along that corridor. But it was called *The Technology Highway*, and it was pretty empty.

So we certainly had some of the ingredients; but why I make the point: You can have a cluster; you can have some of the ingredients; but if they have not been coalesced and they're not being leveraged-- Many people like to think that we just sat and waited for MIT and Harvard to drive all of this; and that was not the case at all.

I think the thing about my having gone to Wellesley is that MIT is Wellesley's *brother school*. So I've been going to Kendall Square since 1968, and I have seen that transformation. And it has undergone a whole new transformation in the last decade.

Yes?

ASSEMBLYMAN DePHILLIPS: Can I ask a question about *hubbing*?

DR. WINDHAM-BANNISTER: Yes.

ASSEMBLYMAN DePHILLIPS: I mean, when you rolled this out -- when the Life Sciences Center was created in 2007 -- was that on your plate for discussion -- about where the hub should be for the life sciences industry in Massachusetts?

DR. WINDHAM-BANNISTER: It absolutely-- Well, you mean the *hub*, as in where the Center should be?

ASSEMBLYMAN DePHILLIPS: Exactly; yes.

DR. WINDHAM-BANNISTER: So when I took the job, there was no physical center.

ASSEMBLYMAN DePHILLIPS: Sure.

DR. WINDHAM-BANNISTER: There was nothing.

I decided to put the office in Waltham, which raised a lot of consternation and a lot of questioning: Why not Cambridge; why not Boston? But I was very clear about the fact that this was a statewide initiative; and that

there actually was a little mini-cluster in Waltham. The VC, such as they were in Massachusetts, had kind of concentrated there. And so that made sense to me, because it sent a very strong signal that this was not the Boston or Cambridge initiative; it was the Massachusetts initiative. There was free parking, there was lot of space, it was not a terribly expensive place to be. But it sent a very, very strong signal. It was easy for people to get to, coming into any of the major -- the major--

ASSEMBLYMAN DePHILLIPS: Yes, and I didn't mean the Center exclusively; I meant the industry as a whole.

DR. WINDHAM-BANNISTER: The industry?

ASSEMBLYMAN DePHILLIPS: Because we're having this debate here, in our state, where should-- Or should we have a hub? If so, where should it be? And I mean the industry as a whole. And I actually -- as I mentioned, our company has offices in Massachusetts; and we're in Westborough, which is 25 miles, as you know, west of Boston.

DR. WINDHAM-BANNISTER: Right.

ASSEMBLYMAN DePHILLIPS: And we actually had meetings yesterday where we're sitting around, sitting talking about, "Should we be in Cambridge? Should we be in Waltham?" which is actually a very good choice now.

DR. WINDHAM-BANNISTER: Right.

ASSEMBLYMAN DePHILLIPS: And so, did Massachusetts go through that exercise to decide should it be Cambridge; is it Cambridge? And actually I had a coworker yesterday, who was saying, "We need to be in Cambridge."

DR. WINDHAM-BANNISTER: Well--

ASSEMBLYMAN DePHILLIPS: So should we have that debate here?

DR. WINDHAM-BANNISTER: So let me-- This initiative focused on five sectors that comprise life sciences: biotech and pharma; medical devices, diagnostics, and bioinformatics. And different parts of our state make logical sense to be hubs for different sectors. So our goal was to help build the infrastructure, help build out some of the capabilities so the different regions of the state could play to their strengths.

What we call the North Shore of Massachusetts and the South Coast really lend themselves to medical devices. The western part of the state lends itself to bioinformatics. No one is ever going to out-pace Cambridge or Boston for pharma and biotech. So our goal was not to consciously create or force a hub; but rather, to invest and put the enabling conditions in the different regions of the state so they could play to their strengths.

And we did give grants -- often \$250,000 -- to different regional economic development councils to hire consultants to better understand their capabilities in the life sciences, and then to come forward to the Center with proposals that really made sense.

So we were not interested in funding the western part of Massachusetts to try and compete with Harvard for NIH grants; it really made no sense.

So there are different hubs around the state.

ASSEMBLYMAN DePHILLIPS: So there are mini-hubs in the state.

DR. WINDHAM-BANNISTER: There are mini-hubs.

ASSEMBLYMAN DePHILLIPS: Okay.

DR. WINDHAM-BANNISTER: Absolutely. Cambridge and Boston are the hubs for bio and pharma; they are not the hubs for medical devices; they are not the hubs for bioinformatics.

ASSEMBLYMAN DePHILLIPS: Thank you.

MS. HART: And if I may -- just for a point of order, for the record, I wanted to recognize the fact that Dan O'Connor has joined us.

MR. O'CONNOR: Sorry I'm late.

MS. HART: Thank you, Dan, for being here. No worries.

And also Jim Hooker is here, representing Senator Greenstein. So thank you, Jim, for being here.

DR. WINDHAM-BANNISTER: Thank you for joining us.

So here's a question I'm sure that you're asking, especially those of you who have some budgetary responsibility. And it is probably the most common question that I get; and I've sanitized it for purposes of this presentation.

Where did Massachusetts find a billion dollars? But you could put a blank after "where the *blank*?" You can put in any four-letter word that you like -- I have been asked that question in that way. Where did Massachusetts find a billion dollars; especially if you think about this: 2008, at the height -- or, if you will, at the low point of the economic recession.

So 10 years, \$1 billion; up to -- right? -- because this was envisioned the way the statute is written -- it's *up to* \$1 billion. So, you know, it means that Massachusetts -- there's a difference between *shall* and *will*. So starting out of the gate, it's -- we would fund this as we could every year. So the budget came from three sources. The first, and most of the money as you can see, came from a share of the bond cap. And that had to be used for infrastructure. What the state essentially did was to give over to the life sciences, again, a share of its bond cap; and most often was able to honor that obligation. But it was really taking money that might have been used for other projects -- that may have been life sciences-related, but were not coordinated as such -- and giving them to a single authority to manage.

A quarter of the budget is not cash at all. It is the authorization given to the Life Sciences Center to award up to \$25 million a year in tax incentives. So this is the authority to defer tax revenues for the state.

There are 10 different tax incentives; some are refundable tax credits, other are for sales taxes; others are R&D credits. It cannot be sold or bartered; they must be used by those companies. So we didn't create a market for incentives.

And some of-- But they are all tied to job creation. And companies compete for them,; and you must be in Massachusetts to apply for the incentives, and they can be clawed back if you do not hit the job creation targets that you promised. So these essentially were incentives in exchange for job creation.

SENATOR SINGER: Just one question.

DR. WINDHAM-BANNISTER: Yes.

SENATOR SINGER: Do you have internal staff that does the analysis, or do you use outside groups to do that?

DR. WINDHAM-BANNISTER: The Center has a very small staff; there are about 10 full-time staff and 5 interns who are there. The Center works very closely with the Department of Revenue. But companies fill out an application for these incentives -- what they intend to do with them, how many jobs they intend to create in the 12 months following the receipt of those incentives.

SENATOR SINGER: But what about the loan fund?

DR. WINDHAM-BANNISTER: The loan fund -- I'll talk about that in just a minute--

SENATOR SINGER: Okay.

DR. WINDHAM-BANNISTER: --because we did not try to have, under one roof, all of the talent that we needed.

MS. HASSETT: Sue?

DR. WINDHAM-BANNISTER: Yes.

MS. HASSETT: (off mike) Were those new tax incentives, or were they just consolidated underneath the applications?

DR. WINDHAM-BANNISTER: Some of them were new, and some of them were consolidated. Some of them were incentives that the state already awarded, but they were given over to the Center to be awarded strictly to life sciences companies.

The last tranche, as you can see, comes from the state budget. But, guess what? It's not a line item. It's an outside section, and it authorizes the Center, or entitles the Center, to the first \$25 million of a consolidated net surplus. Most states, at the end of a year, have a consolidated net surplus, because it's an accounting artifact -- we had planned to spend *X* on *Y*; we didn't; or, CMS owes us *X* amount of money for their share of Medicare and Medicaid. So the Comptroller would declare whether or not there was a consolidated net surplus, and we were entitled to the first \$25 million. I can tell you, some years we get \$10 million, and not \$25 million.

So this money was not straight-lined, in the sense that there were years where we received less than \$100 million. And it was very much what the state could afford in any given year.

Yes?

ASSEMBLYMAN ZWICKER: So in the investment fund, that's, in part, public dollars being invested into these companies, right?

DR. WINDHAM-BANNISTER: Part of it, yes.

ASSEMBLYMAN ZWICKER: Part of it; and some private dollars too.

Did you, then-- Two questions: Did you, in a sense, own a piece of the company; was there revenue coming back your way at all?

DR. WINDHAM-BANNISTER: No.

ASSEMBLYMAN ZWICKER: So it was grants--

DR. WINDHAM-BANNISTER: They were loans.

ASSEMBLYMAN ZWICKER: Loans.

DR. WINDHAM-BANNISTER: Some were grants and some were loans.

So I'll talk about that in a minute, but very quickly let me answer your question.

So the capital fund grants for infrastructure -- and I'll talk about what kind of infrastructure and how we use them -- the tax incentives -- 10 tax incentives; competitive process to get them. If companies hit 80 percent of their target-- Unless they hit 80 percent, we could claw back the incentives. If they hit 90 percent, they could come back next year, and they could get more incentives.

So rather than offering a huge number of incentives in one lump, we were sort of giving them as the companies were earning them.

This fund, the Investment Fund -- it's called this in the statute -- was our totally discretionary fund. We could use it for grants, for stipends, for loans. And it covered the Center's operating budget, which was very modest, as you heard me say. We had 10 people; very small.

SENATOR SINGER: Did you max out the amount of money one firm could get from the fund?

DR. WINDHAM-BANNISTER: We did; yes.

SENATOR SINGER: What was that?

DR. WINDHAM-BANNISTER: From a single program, but not from multiple programs.

SENATOR SINGER: Yes, but from a single program -- what was-

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DR. WINDHAM-BANNISTER: So the loan fund was generally no more than \$1.5 million for early-stage companies. But they could also apply for interns, or they could get other types of grants from the Center.

SENATOR SINGER: And was there a ratio of grant-to-loan, or was that just arbitrary?

DR. WINDHAM-BANNISTER: No; it was arbitrary. It was just, when we looked at our annual budget, how much we were going to deploy for each one of our programs; because we had an investment portfolio.

SENATOR SINGER: Let me just ask -- in that fund, what percentage of that was paid back via the loans, as opposed to just grants that were not paid back and absorbed by the public?

DR. WINDHAM-BANNISTER: Well, the way that we structured the loan program is that these were five-year term loans; so no payment due until the end of the term. They were subordinated; they did not have to be capitalized. And there was a 10 percent interest on those loans.

We took no equity in the company. We could take warrants; I think we took warrants in about two companies while I was there. We would take an observational seat on the Board. Our argument to the state and to the legislature -- because there were some legislators who were very aggressive about wanting us to turn this into an evergreen fund -- was to point out to them how long it takes for life sciences companies -- and in particular, drug discovery and development, diagnostics -- to really start to make money. And that if we wanted to maintain an equity position, most of our money every year would eventually be going just to maintain the position in the companies we had funded.

Our argument to the state was that the return to the state was job creation, company retention, capital investment, retention of these companies; so sales taxes and taxes on their revenues. And that was the goal that was consistent with the state's objectives.

SENATOR SINGER: Did you have any guarantors in this?

DR. WINDHAM-BANNISTER: Guarantors? No; no, these were not-- We would write them down; so if the companies went under, they would

convert to a grant. But what happened is, we -- and I'll talk about this a bit more when I get to this program; because I will talk about it -- we created another fund, that wrapped around our fund, that enabled companies to invest in early-stage companies. We were vetting the companies. We were deciding they got no rights of first refusal; but what they got -- which was extremely attractive to them -- was an early look at a lot of young companies under development in Massachusetts. And because of the advisory board that we used to vet these companies, they had access to a lot of expertise that they would not have normally been able to access. And with the permission of the entrepreneurs, we would introduce these companies to the entrepreneurs.

So J & J, for example -- which is one of the companies in this consortium program -- spotted 13 companies in the very first year that were of interest to it. So they put additional investment into these companies; they would mentor these companies. A number of the companies were ultimately acquired.

When the company raised a Series A -- if they did that during the five-years of the loan, or when they did it -- they had to repay, plus 10 percent interest. A quarter of the companies that we funded prepaid their loans. In other words, they paid them back with 10 percent interest prior to the five-year term.

So it-- You know, I think we were probably putting in \$10 million to \$15 million a year; and I'll show you a little bit on the leverage on that money. But it was not intended to yield a direct financial return; we were not using it as a way of turning ourselves into an evergreen fund. We were wanting to develop a reputation among strategic investors and institutional investors as a state that wanted to help young companies grow; and a state that was willing to help de-risk early-stage companies. So they were less risky investments for VCs and for a company.

UNIDENTIFIED MEMBER OF AUDIENCE: Excuse me, if I may.

What was the success rate for the entrepreneurs? So, you know, what was the pool of applicants versus awardees?

DR. WINDHAM-BANNISTER: The success rate -- we might get 100 applications, and we might fund 10 or 15 companies.

UNIDENTIFIED MEMBER OF AUDIENCE: A year?

DR. WINDHAM-BANNISTER: Around; around. It was a very rigorous program. They were first peer-reviewed; then they were moved forward to our advisory board; they were then moved forward to finals, and they had to come in and make a presentation. So it was a tough process. It became very clear this wasn't the state doling out money.

Every applicant received feedback after their process. Some would apply multiple times, and were ultimately successful. But the goal was to make all the companies better able to compete for investment. But we were being very selective. And in 2013, I believe, 9 of the 16 companies that filed for IPOs had gotten money from the Center.

Yes?

UNIDENTIFIED MEMBER OF AUDIENCE: (off mike) Could you provide some details on the claw back mechanisms? What was the system by which you gauged and did the data collection, and what was the--

DR. WINDHAM-BANNISTER: Sure.

So our enabling statute enabled us to have a relationship with the Department of Revenue; and whereby companies would give their approval for DOR to give us data on their hiring. And as part of their tax filings with the state, they would have to show net new job creation that attached to the incentives that they had gotten from the state, including the salaries and the educational level of people getting those jobs. And I'll show you why we wanted to know that in a minute.

As I said, if they had not hit a certain target, a certain percentage, of the net new jobs -- they had 12 months to hire -- then we had -- the Center,

with information from DOR, had the authority to claw those incentives back. We had the option to give them one more year, because often companies had very -- had made a very good faith effort to hire, but they might not have been able to. So we would assess the rationale for them not having met their goals. And we could choose to give them one more year, but they had to sit out; they were not able to apply again for incentives. They had to hit 90 percent.

For companies that chose not to use the funds -- which some did; they could see that they were not going to hit the target, we were publishing everyone who got the incentives, and we would publish how many jobs they created; and of course, many companies did not want to be embarrassed, so they would voluntarily return the funds. And for companies that had overachieved -- that gave us sometimes money where we could actually give them additional incentives.

We set aside 20 percent of the pool for small companies. But, the challenge-- This was not a great program, really, for small companies, because, given that they had to hit a target, if they were proposing to grow 10 jobs -- if you think about that percentage -- if they failed by 2 jobs, they had failed to hit the target. So we did this, but we really realized that it was not the best program. It worked much better for medium-sized and larger companies. But we did set aside a certain percentage. And we would make it -- we would publish this: XYZ Company -- the Center has clawed back its incentives.

I believe that the National Association of State Legislators presented this program as a case study of how to really get good leverage on a tough incentive package. And what we found is, because the state -- the companies knew we would claw them back, they got more realistic about the number of jobs that they were proposing to award.

Yes?

MR. LIZURA: Doctor, of the--

DR. WINDHAM-BANNISTER: Please call me Sue. (laughter)

MR. LIZURA: Of the stable of 100 companies that might come in and apply, where did they come from? Were they coming out of the universities? Were they-- What was the mix?

DR. WINDHAM-BANNISTER: Variety; variety. They were coming out of garages; they were coming out of the universities. I think the good thing about this fund and this program was it wasn't looking only for spinouts from the academic institutions. And because we were broad -- you know, devices, bioinformatics -- very often you have entrepreneurs who were not coming out of academia. Very often you have physicians who are the entrepreneurs for medical device companies. So it really enabled entrepreneurs all around the state to have a place that they could come for funding.

Yes.

ASSEMBLYMAN ZWICKER: Did you find sort of an optimal size company? You sort of alluded to a piece of that with the tax incentives. So, you know, if you have a start-up and it's receiving angel investment, and a more mature company that's ready for VC, did you find, after a while, that your program seemed to be optimized if they targeted a certain sized company -- tax incentives, etc.?

DR. WINDHAM-BANNISTER: Yes, absolutely. And really, it was optimized by targeting larger companies.

I neglected to say that not only did the companies have to hit a hiring target -- net new jobs -- they had to retain those jobs for a five-year -- at least a five-year period. So we were monitoring every year, and it meant if they laid off people in another part of their business, they were behind. They had not created a net new number of jobs.

ASSEMBLYMAN ZWICKER: Sure.

DR. WINDHAM-BANNISTER: It was a really, really tough program, but it worked best for very large companies.

Now, we didn't use it to attract them; no one could apply for any of our programs unless they were already in Massachusetts. So these were not incentives-- The incentive was the platform that we were building and the array of programs that were available if they came to Massachusetts.

ASSEMBLYMAN ZWICKER: Sure.

So following up from that -- how did you target, then, the smaller companies that did come out of the garage, or the universities? Tax incentives aren't going to work--

DR. WINDHAM-BANNISTER: Right; so we had grants--

ASSEMBLYMAN ZWICKER: Okay.

DR. WINDHAM-BANNISTER: --we had a grant program for the very early-stage companies. So they could get up to \$250,000, and that was truly a grant. They usually -- they were using them, maybe, to do a prototype. They were often using them to do their business plans; they might have been using them to get their patents.

They had to have a mentor; they had to have identified someone who was working with them on this.

They could apply for the internship program, which I'll talk about in a moment. We were building incubators and accelerating spaces, and they could take advantage of those. So there were a lot of-- They could apply for a collaborative grant to work with an academic institution. So there were a lot of other programs for which they could apply.

MR. O'CONNOR: Sue?

DR. WINDHAM-BANNISTER: Yes?

MR. O'CONNOR: Just two quick questions.

Thanks for presenting; I appreciate it.

First, I may pre-empt some of your slides.

DR. WINDHAM-BANNISTER: That's okay.

MR. O'CONNOR: Is there a program that you would identify as your most successful? And then, secondly, as you've been going, are you -- do you evaluate the programs and kind of whittle away ones that are not, and grow the ones that are?

DR. WINDHAM-BANNISTER: Yes; that's a great question. The answer is absolutely "yes."

Our two most successful programs -- well, three -- our accelerator program -- this is the loans to early-stage companies, because it really did attract the attention of the venture community who said, "Now, this is great, because we would like to put \$10 million, or \$20 million, or \$30 million, or \$40 million into a company. Companies that need \$1 million or \$2 million are a little early for us. So this is great; here is the state saying they will put money into some of those companies and they're not diluting our investment in any way."

So that was very, very attractive to them.

The second is the internship program, which I will talk about in a minute; and the third -- our capital grant.

Very quickly -- I mentioned to you that the Center is governed by a Board, and you can see that two members of the Board, by statute, come from the Governor's Cabinet; the others, by statute, represent our major stakeholder groups.

This was our bulletproof vest. We decided that all of our grants and loans would be awarded on a competitive basis. And there was no way that we would, or could, or should have a huge staff with all the expertise needed to vet our deal flow, our applications. So we asked one of our preeminent scientists, Harvey Lodish from MIT -- the Governor asked him, actually -- if he would chair a scientific advisory board. The Scientific Advisory Board is made up of representatives from academia, all of who have had entrepreneurial experience; our top VCs in life sciences; industry leaders;

and serial entrepreneurs. The members rotate; they commit to sitting there, taking off their institutional hats, but simply looking at the best use of these dollars. You know, “Would this investment make a difference? Would it be beneficial?”

And they really, one -- with all due respect to the council of men and women who are here, and the Senators and other legislators -- they helped build a bulletproof vest around our decision making so that it was protected from the political process.

Everyone knew, even if they really wanted an investment made in their district, that it was going to have to go through a very rigorous process. And it was very hard, given the caliber of the people on this group, for applicants to quibble about the fact that someone just didn't understand what they were trying to do. This represents sort of the blue ribbon of our community, in the sense that it rotates. But you have people who were coming in from the western part of the state to the meetings.

Everyone served on this pro bono; and they put a lot of time and energy, and they were happy to do it, one, to work together; they loved looking at all of this new science and technology together. And they knew that their input was making a difference. This Board made recommendations to the Board of Directors for funding.

Yes.

UNIDENTIFIED MEMBER OF AUDIENCE: (off mike) Were all the VCs residents of the state of Massachusetts when this was created, or did this draw more?

DR. WINDHAM-BANNISTER: They all have offices in Massachusetts. And you know, firms like Claris -- there were a number of firms that aren't on this list because they had rotated off.

UNIDENTIFIED MEMBER OF AUDIENCE: Did it draw in more VCs into Massachusetts?

DR. WINDHAM-BANNISTER: It did indeed; it absolutely did. Knowing that there was a chance to really look at some of this early technology, and the state was helping to fund it in many different ways -- as I'll show you in just a moment -- absolutely. And so the VCs were very happy and sort of willing to-- Flybridge -- I mean, you name any of the top VCs in Massachusetts; they have served on this Advisory Board.

Yes?

MR. LIZURA: Did this Board have any say in the capital fund -- the \$500 million capital fund?

DR. WINDHAM-BANNISTER: They did for one category.

So the way that we divided the capital fund is into several categories: grants for schools to upgrade their ability to teach STEM; basic infrastructure upgrades for our community colleges and our four-year colleges; and then what we called the *WOW projects*. And the *WOW projects* were capital projects that supported cutting-edge science. And those projects were reviewed by this Advisory Board.

MR. LIZURA: How much was that of the \$500 million?

DR. WINDHAM-BANNISTER: Those grants could be as much as \$10 million each.

MR. LIZURA: Did they require leverage as well?

DR. WINDHAM-BANNISTER: Yes, they did; and we tailored the leverage to the institution. So if MIT was applying, what we were asking from them was quite different than if UMass was applying, or if a community college was applying.

SENATOR SINGER: Did they pay them back, or were they grants?

DR. WINDHAM-BANNISTER: Pardon me?

SENATOR SINGER: Were they loans or grants?

DR. WINDHAM-BANNISTER: Grants; these were grants.

SENATOR SINGER: So in essence you took a percentage of the fund and gave it away each year to the institution--

DR. WINDHAM-BANNISTER: Half of the fund; \$500 million-- So \$50 million every year, by statute, given where the budget was coming from, was going to infrastructure. A quarter to all of these other investments that we were making; and a quarter in tax incentives.

SENATOR SINGER: But did this affect the other grants the state gave to these institutions?

DR. WINDHAM-BANNISTER: In some cases, it did; yes. Because we were coordinating with DCAM, which is our Department of Capital Asset Management; we reported in to the Secretary of Housing and Economic Development. So in some cases, requests that they had made for certain kinds of grants-- Now, other types of grants were not affected; they were not impacted. This was, in other ways, a new fund for life sciences investments, but it did not take away from other basic infrastructure that they needed; you know, dorms, and the like. So it was not a zero-sum for the public university system.

MS. HASSETT: Was there-- You know, over the years, different states will actually go to the voters for referendums for bonding that supports higher education.

DR. WINDHAM-BANNISTER: Yes, we did issue bonds. MS.

HASSETT: For infrastructure, as well as endowed chairs and the like.

DR. WINDHAM-BANNISTER: Right.

MS. HASSETT: Was anything going on in Massachusetts during that timeframe that would have been complementary to this effort?

DR. WINDHAM-BANNISTER: Yes; yes, the state did issue bonds specifically for this initiative.

MR. LIZURA: For the \$500 million?

DR. WINDHAM-BANNISTER: For the \$500 million; yes.

All right; what data have we been monitoring to see if we were successful?

I'm not going to spend a lot of time telling you what the numbers are; again, there's a handout with all this data, and even a bit more. But I really just want to share with you -- what have we looked at, and how did we decide if we were a success.

The first thing that we looked at simply was the growth of the sector in Massachusetts. And, in 2013, we had an independent evaluator come in -- a group of labor economists -- to look at our impact. We had been counting jobs and things that we could really keep track of. But we had an independent evaluator come in, who really was able to look at more macro-level data and calculate the return on the tax incentives, which we knew, after five years, was \$1.60 on the dollar. So the state was actually getting 60 cents - - \$1.60 for every \$1 of tax incentives that the life sciences was awarding.

But as you can see, very slow growth in Massachusetts between 2006 and 2014; now, remember, there's some overlap there, because this initiative began in 2008. But this was data that the economists were looking at for certain periods.

But it was really only about 1 percent elsewhere in Massachusetts; it was 18 percent in the life sciences. And it has continued to grow at about 15 percent a year. So you can see now that we have about 66,000 people in Massachusetts who work in the life sciences, and \$9 billion in Massachusetts-based wages.

We are now the state with the highest number of life sciences workers per capita. And remember, *per capita*. You're a small state; we're a relatively small state. We will never have as many workers, in total, as New York or California; but per capita, Massachusetts now has. But look at New Jersey; you're up there.

We look at the start-ups coming out of academic institutions; and that number has really ticked up -- very excited about that. We look at VC activity, and we look at IPO activity in Massachusetts.

I showed you this already; but I wanted to say that, in 2016, we, for the first time -- we surpassed California. We had never had more VC money coming in than California. And we were quite a bit behind them.

This is a slide I think you'll find very interesting, and it's one of the slides of which I am the most proud. Those of us in the industry know that life sciences is a big tent. Life sciences companies employ lots of different kinds of people. If we think again only about the academic research, then we are looking at an elite workforce -- Ph.Ds., post-docs. But when we move into commercialization, into the business of life sciences, it's a very, very big tent. And per statute, companies that got incentives from us had to keep track of their net new jobs -- the salaries and the skill levels, the educational levels.

So look at this: When we look at the incentives -- the tax incentives; this is only for the tax incentives -- only 26 percent of those net new jobs have been filled by workers with a master's degree or higher. Half of them have gone to people with a bachelor's; and a quarter, a high school degree or less. So as economic development policy, you know, as policy for creating jobs for people who have skills, this is a good bet. And we know that the salaries in life sciences sectors are higher for the same kinds of jobs. So the people who are in administration, and sales, and marketing, in logistics make more money in life sciences' companies than they make in other sectors.

So for us, this slide is a slide I would take around to the State House constantly to say to them, "This was a good decision." And you can go out -- you can go to your constituents and say, "We are creating jobs for workers who are at mid-skill levels; not just elite workers."

We are looking at what large companies are doing. Are they coming to Massachusetts? We've had some great headlines; a number of them

have not only come and set up big shops, but they have moved their U.S. headquarters.

The really interesting thing for us is that now, of the top 20 biopharma companies, 18 have a presence in Massachusetts. And I would say Novartis was the only pharma company in Massachusetts in 2007. Biogen was there; Vertex was there. But you really didn't have a lot of industry presence, so we're very excited about this.

And I have to say that the benefits of having large companies come and join Massachusetts-- And why have they come? The evaluators who did the study and talked with these companies found that even those that had not gotten any money from the Life Sciences Center came because now Massachusetts had the kind of ecosystem, it had the innovation capacity that they needed. They could find the talent, they could find the infrastructure, they could find lots of small companies. It was easy for them to access those companies; we had really coalesced a community.

And these big companies play a very, very important anchoring role. They are also our sources of talent, as you well know, having so many of them here -- based here in New Jersey.

Yes?

UNIDENTIFIED MEMBER OF AUDIENCE: So some of these companies left New Jersey to go to Massachusetts.

DR. WINDHAM-BANNISTER: I'm sorry to say. (laughter)

UNIDENTIFIED MEMBER OF AUDIENCE: Was it your program, or was it something beyond?

DR. WINDHAM-BANNISTER: Our understanding is that Massachusetts as a place where they felt they had to be. We know that that's why Pfizer closed up shop in Connecticut and came. We know that that's why GE Healthcare came, and subsequently GE moved its headquarters -- because they felt that this is where they had to be. This was an innovation hub.

And because so many pharma companies, in particular, are not doing a lot of internal discovery, they're very dependent on being in a community where there's a lot of start-up activity, there's a lot of *external discovery*, as we call it.

And so Massachusetts became a very attractive place for them to be.

UNIDENTIFIED MEMBER OF AUDIENCE: (off mike) Have you started to analyze your retention of graduates from higher education in the industry that--

DR. WINDHAM-BANNISTER: We have; we have. And I didn't show that, but our retention has gone up.

We always had relatively good retention for people who were interested in academic positions, because you had academic positions given the universities, given the medical schools. But we have retained now a much, much higher proportion of our graduates who are interested in working in industry. They don't have to come to New Jersey now; and especially, of course, people who are interested in starting companies.

UNIDENTIFIED MEMBER OF AUDIENCE: I notice in here -- your suite of offerings -- you didn't talk about post-doc fellowships, or resources along those lines.

DR. WINDHAM-BANNISTER: Yes; exactly. And we purposely, after talking with industry and academia, did not offer those. Because at least in Massachusetts, because of Federal programs, there were a lot of those programs for Ph.Ds. and post-docs. There were other gaps that were important for us to address, so we intentionally didn't have any of those programs.

MR. O'CONNOR: Excuse me Sue; just a quick question.

DR. WINDHAM-BANNISTER: Yes.

MR. O'CONNOR: This is a subjective question, but how much would you attribute to kind of a ripple effect to the programs in the growth? In other words, like, as you look at a program and say this really rippled and made a significant contribution.

DR. WINDHAM-BANNISTER: Well, the evaluation indicates-- And I was just, last year, at a meeting that the President of Amgen held over there -- they renovated their space in Cambridge -- and a reporter asked, "Why are you making such a big investment in Massachusetts?" And he said, "Because Massachusetts has built the kind of ecosystem that we need to be part of. It's a very innovation-oriented community, and this is where we want to be."

Can I demonstrate causality? I cannot. But I can only say that this was not happening in Massachusetts. And MIT, and Harvard, and all of our universities, and all of our hospitals have been there for a very long time, and we have not seen this kind of activity. And, if anything, we were losing our innovators; we had lost our tech companies. And now we have companies like Google, and Microsoft, and a lot of companies that have come back to Massachusetts.

Because I think it's important to note -- as I said, innovation is a process; and all companies that have innovation as part of their business models go through this process. They may spend a longer or shorter time in the development phase; for example, a tech company is going to get through that much faster than a drug discovery company

But we really do believe that by building this strong supporting platform we are enabling other types of innovative companies to thrive in Massachusetts as well.

MR. O'CONNOR: Thank you.

DR. WINDHAM-BANNISTER: Yes?

ASSEMBLYMAN DePHILLIPS: Sorry; I think you predicted my question about causality. (laughter) And I'm a lawyer, so I talk in terms of cause and effect.

DR. WINDHAM-BANNISTER: Of course.

ASSEMBLYMAN DePHILLIPS: So going back to the billion-dollar number -- and it was an up-to--

DR. WINDHAM-BANNISTER: Yes.

ASSEMBLYMAN DePHILLIPS: --\$1 billion.

DR. WINDHAM-BANNISTER: Yes; as you'll see, we will probably not spend a billion dollars--

ASSEMBLYMAN DePHILLIPS: Right.

DR. WINDHAM-BANNISTER: --by June of this year.

ASSEMBLYMAN DePHILLIPS: So what is the actual spend, to date?

DR. WINDHAM-BANNISTER: When I left the Center in 2015-- No, I'm sorry; through Fiscal Year 2017, it's about \$750 million.

ASSEMBLYMAN DePHILLIPS: Okay. And then can you do the causality analyses? Can you look and actually demonstrate or prove that as a result of the \$750 million investment, you have jobs that amount to this, in terms of revenue back to the state?

DR. WINDHAM-BANNISTER: Well, we can look at the number of net new jobs; because they are due to the tax incentives. That we know, because the companies that got the money had to create a certain number of new jobs and retain them.

ASSEMBLYMAN DePHILLIPS: Right.

DR. WINDHAM-BANNISTER: We look at the capital investments that we've made. Can I show absolute causality? I can't. I can only go based on the subjective evidence and what has happened in a very discernable amount of time since 2008.

ASSEMBLYMAN DePHILLIPS: Right. And I'm sure there are CEOs on this list who felt a comfort level in Massachusetts because of the initiative, and the focus, and the backing that the state was giving the industry, even if they were not the recipient of any real dollars.

So I think it's--

DR. WINDHAM-BANNISTER: Governor Patrick went out front and said, "We care about these sectors. We are committed to you; we are doing this investment." And he made it a point -- he went to the bio meetings every year that he was Governor, with the exception of one. We were having a drinking water crisis. The Senate President would come; the various Senate Committee Chairs would come; the Speaker of the House would come; and various representatives would come.

It was a demonstration. They would come; they would meet with companies. We would set up meetings; we would make announcements. It was very clear that we wanted the industry to be there. The Governor would meet with little, tiny -- with entrepreneurs, you know, one- or two-person companies, and say, "We don't care if you just have one job; we want you to be with us in Massachusetts."

So it was a very strong and very consistent message. And having this single point of contact, that would coordinate across the industries that worked directly with MassBio, our trade association, and MassMEDIC, which is the medical device association; and the various cities and towns that were offering various types of TIFs and other types of incentives-- And so we became what we call *Team Massachusetts*, and we would say, "As you sit here meeting with us now, we are the people who are going to work with you and really support your experience here in Massachusetts."

So we just made it easy for people to get what they needed.

ASSEMBLYMAN DePHILLIPS: Yes; I mean, I'm a true believer; 100 percent. And I'll just speak for myself; I'm sure the other legislators can

chime in. But our constituents want to see return on investment. And I believe this is a success story. But for us here, we'll have to make -- we'll have to prove that to the State -- that if we're going to invest along the lines of what you've done in Massachusetts, that the return on investment can be provable; and maybe we can rely upon your success to do that.

DR. WINDHAM-BANNISTER: For sure. Because again, you can take these jobs that we've tracked and -- so you can talk about the growth in the sector and you can basically figure out what types of salaries-- I mean, you can see -- we have a payroll number that we can quote. We can quote the leverage on the dollars, which I will show in a moment. We look at the numbers of companies that are coming in -- which the Governor is always happy, and the legislators are happy to come and welcome, and do the ribbon-cuttings, and this and that.

So I think that everybody has drunk the Kool-Aid; and I think everybody gets it -- that this has made a difference.

Yes?

MR. LIZURA: You had mentioned a portion of this funding was used for marketing and branding--

DR. WINDHAM-BANNISTER: Yes.

MR. LIZURA: --and communications. How much would you say was dedicated solely towards that piece?

DR. WINDHAM-BANNISTER: About \$500,000 a year, we would spend. Because we would -- we and MassBio were the primary funders of the Mass Pavilion at BIO, and we would each put in about \$250,000.

And then the other money -- we would use on marketing campaigns, we would use it to go to other trade shows, to travel internationally to encourage companies to come. So, I would say, probably about \$500,000.

MR. LIZURA: And you talked a little bit about *Team Massachusetts*.

DR. WINDHAM-BANNISTER: Yes.

MR. LIZURA: If you were a life science company, really are you the only stop for that company to provide support? Or are there other places in the state that a company might avail itself -- other programs or support?

DR. WINDHAM-BANNISTER: Right, right.

We were usually the first stop; we would have, sitting at that meeting, depending on the company and what it needed -- we would have someone from MassBio or MassMEDIC; we would-- If it was an international company, we would have some -- a group from the Massachusetts Office of International Trade Investment -- *MOITI*; we would have someone from the Mass Office of Business Development sitting there.

If they were moving into a particular geography, we would have someone there; or if they were looking around, we would know what cities and towns had various parcels available, and so someone would be there from those cities and towns.

So we would be the initial convener; and then they would work independently with the specific agencies that would meet their needs. Similarly, if they contacted another agency first, they would reciprocate; they would have us at the table.

The whole purpose was to show a united coordinated front, and to say, "If you come to this state, it will be very easy for you to find what you need. And the people you're seeing now are the people you will continue to see."

Okay; so, quickly, in blue -- these are the companies that have a thousand employees or more. And I will tell you that the vast majority of them had no presence in Massachusetts before 2008.

We monitor external evaluations. You know, so Battelle does a report every year, and the Milken Institute does an evaluation every year. The U.S. Chamber of Commerce does a study every year; and for the first time Massachusetts is -- Boston is the best hub for start-ups.

ASSEMBLYMAN ZWICKER: Can I just add, for the record, that if we don't have a New Jersey city on there in the near future, that we've not done our job. (laughter)

DR. WINDHAM-BANNISTER: That's-- Again, we've thought about the metrics that would demonstrate success for us; and this was one of them. We wanted to be known as a great place to start companies. And we got an award from the state Science and Technology Institute.

MR. LIZURA: So intentionally-- Can you go back to the previous slide?

DR. WINDHAM-BANNISTER: Sure.

MR. LIZURA: So this was the Chamber -- your Chamber of Commerce did this report.

DR. WINDHAM-BANNISTER: Yes.

MR. LIZURA: Did you tailor your information dissemination in order to better align with some of the ranking criteria that these ranking entities used? So is there a piece of this which is, this group uses X, Y, and Z to rank their -- as there-- And you don't always know the special sauce that they use.

DR. WINDHAM-BANNISTER: Sure, sure.

No, we didn't. I mean, we were looking at the metrics that we felt demonstrated to our client -- which was, first of all, our funder, the legislature; and then to industry, and to the citizens of Massachusetts who were funding this -- what metrics were consistent with what we had been trying to achieve. And if you think back on them, they were good science and good business, commercialization, leadership. It wasn't to be *the* leader; I mean, it really

wasn't. We were happy that we got there, but that wasn't-- And, you know, job creation and economic development.

So these were metrics that reflected what we were trying to accomplish.

ASSEMBLYMAN ZWICKER: I think the other thing very remarkable about the Top 10 there, is that a common narrative in New Jersey is we're a very expensive state. And yet--

DR. WINDHAM-BANNISTER: As our we. (laughter)

ASSEMBLYMAN ZWICKER: Right; exactly -- as is the Bay Area-

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MR. LIZURA: All those are more expensive.

ASSEMBLYMAN ZWICKER: --Los Angeles, New York, etc.

DR. WINDHAM-BANNISTER: Right.

MR. LIZURA: Same; or more expensive.

ASSEMBLYMAN ZWICKER: Yes.

So, again, the point being -- that's not what's stopping the explosion of growth in New Jersey.

DR. WINDHAM-BANNISTER: True, true; I agree with you.

SENATOR SINGER: But I think you have to understand one thing. When you deal with these groups of individuals, where they live is very important to the location of these facilities.

ASSEMBLYMAN ZWICKER: Right.

SENATOR SINGER: Where the scientists want to live in an area, like close to metropolitan New York, to enjoy the enjoyment of where they're living.

DR. WINDHAM-BANNISTER: Yes; you make a great point; absolutely.

SENATOR SINGER: Being close to Boston -- the same.

DR. WINDHAM-BANNISTER: That's exactly right.

SENATOR SINGER: So don't ever think that doesn't play a major role; because for example, these companies-- Remember, this is not a 9-- You're scientists; this is not a 9 to 5 job. You may come to work at 2:00 in the morning; so you want to come to a place where you feel secure, safe, and everything is great; but you also want to have that quality of life for your family and everything else like that. These are areas that are great attractors to that.

DR. WINDHAM-BANNISTER: And that's why we paid attention to funding infrastructure in different places around the state, so that the capacity was there. And it's why the interest, on the part of the cities and towns and the real estate developers, as part of the ecosystem, was so important. Because they were willing, and the state was willing, to offer different kinds of incentives to them as well. So it was a collective effort. Because many people think we can put an incubator on a throw-away parcel of land and people will come, because it's cheap real estate. That's not often the case.

ASSEMBLYMAN DePHILLIPS: I just want to jump in.

I agree with the Assemblyman Zwicker about the cost of living in some of these places -- like the Bay Area and Los Angeles; I mean, the most expensive in the country. So they're doing something right; but I also agree with the Senator's comment that the 20-somethings and the 30-somethings-- And we've heard this already, in testimony to this Task Force -- that they have a problem with our market here, in terms of wanting to put down roots and invest themselves here, in New Jersey, particularly. And, you know, my son's in college in Boston; and we are already having conversations with him about, "Well, you're going to come back to New Jersey, right? I mean, we have so much to offer here in terms of entrepreneurial opportunities." And you know, it's a little difficult to compete with Boston if there's not an identifiable hub.

DR. WINDHAM-BANNISTER: Yes; right.

ASSEMBLYMAN DePHILLIPS: And also the branding and the marketing around state--

DR. WINDHAM-BANNISTER: Exactly; that's right.

ASSEMBLYMAN DePHILLIPS: --is not where it should be.

DR. WINDHAM-BANNISTER: That's right; that's right.

We have transformed ourselves into an exciting place for entrepreneurs.

ASSEMBLYMAN DePHILLIPS: Exactly.

DR. WINDHAM-BANNISTER: We used to be an exciting place for academics; and it was an intentional effort to do that.

SENATOR SINGER: But I think you have to listen to what was said, which is so important.

They didn't look to put their facility in one of the troubled areas of the state, or problem cities in the state, and say, "Okay, we're going to do this there." This is not based on that. It's based on where it makes sense for the people you're attracting to want to see and be involved in it.

DR. WINDHAM-BANNISTER: That's true; that's right. And that is where the state, and the cities, and towns were able to be helpful; and the city. Because we realized-- And that was a role that we could play. We could put the money up to put infrastructure in places where it would be impactful. And that is a very important point.

ASSEMBLYMAN DePHILLIPS: And another thing about Massachusetts -- and I can speak to this, just because I spend a lot of time up there with my day job -- Massachusetts has multiple marquee names where they can sell the state. I mean, it's Cambridge; it's Waltham; it's even Westborough and Marlboro out that way; Boston. We need-- Princeton is our marquee name, right?

SENATOR SINGER: The Route 1 corridor is very--

ASSEMBLYMAN DePHILLIPS: Well, it's--

DR. WINDHAM-BANNISTER: But you know what? But we created some of those.

ASSEMBLYMAN DePHILLIPS: But you can sell-- You can sell-- Yes, right.

DR. WINDHAM-BANNISTER: Honestly. I mean, Westborough was not a hot spot. But, you know, we created -- we created certain corridors--

ASSEMBLYMAN DePHILLIPS: Yes.

DR. WINDHAM-BANNISTER: --you know; the life sciences corridor, which is five cities and towns: Somerville--

ASSEMBLYMAN DePHILLIPS: Exactly.

DR. WINDHAM-BANNISTER: --Quincy--

ASSEMBLYMAN DePHILLIPS: Yes.

DR. WINDHAM-BANNISTER: --Cambridge -- that have come together to brand themselves, and to make some joint investments, and to approach the state to get investments for various enabling infrastructure.

We took a very challenged area -- but one that made sense for advanced manufacturing; and I'll show you that in a minute -- and put \$30 million into a vector and sell manufacturing facility. It made sense to put it there, even though-- I mean, it's in Fall River; that's one of our old mill towns. But there is a nice group of companies in that area. So it's strategic investment, I think; and we're all agreeing on that. It's just sort of thoughtful.

ASSEMBLYMAN DePHILLIPS: No doubt, no doubt.

MS. HART: So I just wanted to-- Sue, I could listen to you, literally, all day, and into next week.

I want to maximize our time with you. We have, probably, about 25 more minutes, so I ask you to, maybe--

DR. WINDHAM-BANNISTER: And I was going to stop at quarter of.

MS. HART: Okay, okay; so I'd ask you to think about where you're going next.

Thank you, thank you.

DR. WINDHAM-BANNISTER: Absolutely; I'm watching the clock.

Thank you, Debbie.

MS. HART: Great; thank you.

DR. WINDHAM-BANNISTER: So let me just look -- because this is actually-- I'm now, sort of, going to move into execution. Again, my slides are here, so I'm not going to go into all of this in great, great detail.

Here are some things to think about that are very important as principles.

Think about leveraging the State money. You know, we used our money to seed, accelerate, and cross leverage our match. Use a competitive process to award the money. Make decision-making inclusionary. Invite the experts -- I'd like call it the *wisdom of crowds*. Think of a portfolio of investments; as I hoped I showed earlier, this isn't a one-note approach. It takes an investment. If you rev up your pipeline of early-stage companies and there's no place for them to go, you haven't solved the issue. If you build a bunch of infrastructure, and there are no entrepreneurs looking to come into that infrastructure, it won't work.

As I said, the best use, I think, of public money is seed. So start things, rev things up, and cross leverage the money.

Use the money to incent collaboration and partnerships; use it to start to really build an ecosystem. And remember that innovation is a bottoms-up process. In government, we tend to think of top-down. So what we really-- This needs to be market-driven; we need to put the things in place that let the innovation community do its work. It's very different from traditional economic development.

I'm not going to read every one of these; but I want to show you that this is the Center's investment portfolio. Now, someone had asked earlier, did we sunset programs or shelve programs? We absolutely did. We had some programs that were intended to help companies in the mid-tech space -- that had gotten SBIR, STTR grants -- roll over into manufacturing. And we just weren't getting very good applicants for that; so we shelved that program.

Some of these programs are multi-year programs. So we would give a grant in year one, and then we would wait three years to run the program again. So it gave us the opportunity to bring new things on line very, very frequently. That kept things fresh; that kept the community saying, "Oh, my gosh; look at all these-- Something new, something new."

But then we had some core programs that worked very well.

MS. HART: A key here is the fact that you had a control over what the programs were. The legislature funded you--

DR. WINDHAM-BANNISTER: Correct.

MS. HART: --then you had the ability to figure out--

DR. WINDHAM-BANNISTER: Exactly right; that is right.

MS. HART: Okay; that's a key point.

DR. WINDHAM-BANNISTER: They gave us the money, and they let us do our thing. And that's, again, bottoms-up; not top-down.

But I will say, very quickly -- you can see we had a number of programs to encourage translational culture; everything from funding faculty-and entrepreneurs-in-residence at different universities; to funding grants for early career scientists who were interested in translational research and funding industry and academic partnerships.

So companies could literally come with an academic partner and apply to the Center to co-fund some of their projects. And we would give our money to the academic institution, but we were matching up to a certain

amount of money what industry was putting in. These could be little-bitty start-up companies, or they could be great big companies. The point was that collaboration was going to accelerate the development of a technology.

Yes?

MR. O'CONNOR: Sue, how many of the programs that you have did you borrow from another state -- that you saw it, it was working there, you tried to implement it here; versus how many did you implement? And on the implementing ones or, you know, identifying your own, how did you do -- how did you come up with those programs?

DR. WINDHAM-BANNISTER: I have to tell you -- we benchmarked Serum; we benchmarked the Ben Franklin Fund; we benchmarked the North Carolina Bio Tech Center. We did a lot of benchmarking. And we really didn't find a lot that we felt matched what we were trying to do, or reflected the strategy that we were trying to use. We certainly, I think, got some good ideas from the Ben Franklin Fund; we got a lot of good ideas around the importance of workforce development as something we should -- you had to pay attention to that, from North Carolina. But in the main, we were really building it from scratch, I have to say.

MR. O'CONNOR: Thank you.

MR. LIZURA: On the faculty piece--

DR. WINDHAM-BANNISTER: Yes.

MR. LIZURA: --did you spend -- were you involved in recruitment of the Rock Star academics in any of the institutions; or was that really--

DR. WINDHAM-BANNISTER: We would simply give grants. An academic institution would come and say, "We are having a conversation with X, Y, Z Rock Star faculty person; it would be very helpful if we could get \$1.5 million to help with--

MR. LIZURA: So there's some of that piece of that?

DR. WINDHAM-BANNISTER: --that faculty member's laboratory, etc." Yes; so we did it. And some of these went to the public university, as well as the private universities.

MR. LIZURA: Private.

DR. WINDHAM-BANNISTER: Yes.

SENATOR SINGER: I think it's important to note, too, that they established with scientists to be the head of it.

ASSEMBLYMAN SCHAER: Forgive me for beating a dead horse -- or making sure that's it dead (laughter) -- was there any reportage whatsoever between your organization or its component parts, or grant recipients, or loan recipients, back to the legislature?

DR. WINDHAM-BANNISTER: Please -- I'm sorry; would you repeat the question?

ASSEMBLYMAN SCHAER: Was there any reporting back--

DR. WINDHAM-BANNISTER: Oh, absolutely. We were required -- we were required to issue an annual report of all of our work; every grant. We would -- I would regularly meet with different members of the legislature; and we made -- and you talk about media -- we made a media event of every single grant that we made, or loan; any award. And we would invite the legislators from those districts to come out and be part of those announcements.

ASSEMBLYMAN SCHAER: My concern is, I think that many of our concerns are that if the Legislature is involved, the faculty becomes politicized. I just want to avoid that politicization.

DR. WINDHAM-BANNISTER: No, not necessarily.

SENATOR SINGER: That's not -- that shouldn't be a problem. I mean, the reporting comes usually (indiscernible).

ASSEMBLYMAN SCHAER: I'm sorry; we live in *what* state, Bob? (laughter)

Sue, we live in what state?

SENATOR SINGER: Well, I can tell you from my experience on the Commission of Science and Technology -- it was never a problem.

DR. WINDHAM-BANNISTER: Here's what we wanted to avoid. We wanted to avoid legislators coming to us and saying, "Someone from my district is submitting an application, and I want it to be funded." Because we had a documented process, it was transparent, we published it; I mean, you literally would see what were the steps that an application would go through. Every time we opened a program at our Board meetings, which were public, we would remind people, "Here is the process; here is the timeframe. This will happen by *this* time; this will happen by *that* time."

So it was very, very transparent. It made it very hard for us to make any decisions that were being made on anything other than merit. Now, that said -- and I do want to move on -- our advisory groups and our Board understood that this was a statewide initiative, and we were trying to lift all the boats. We had -- we needed to focus on our premier academic institutions because they were the ones that had gotten us to where we were. But we were trying to build overall capacity; and therefore, all things being equal, if a great application was submitted and it was coming from a public university versus a private university, we would give consideration to the public university. So we tried to balance.

I'm going to, sort of, move through the rest of this and see if there are any questions

So ecosystem -- a lot of investments made around convening, and sharing, and partnerships. A lot of support for entrepreneurship, ranging from business plan competitions, to funding for companies, to the infrastructure. A lot of attention paid to workforce development, starting with kindergarten; and infrastructure.

I'm going to give you just one quick example of each of these. I think I've already talked about our academic investments, so I'm going to move on.

I mentioned helping companies grow. We fund a lot of business plan competitions; some at academic institutions. Our largest is a free-standing business plan competition called *MassChallenge*, which has become very, very popular; and sponsorships.

The other end -- I mentioned incentives; and in the middle we're giving grants and loans. There's a new program that the Center just launched with Takeda, which is targeted at female entrepreneurs; and it is a mentoring and coaching program.

A lot of workforce development programs, skill development -- so with curriculum, state-of-the-art training, infrastructure upgrades, and then career pathways.

So our internship challenge -- the Center has funded almost 3,000 interns. They go to early-stage companies; so it's a two-fer. It's free labor for start-ups; it exposes students to working in a start-up. And you can see a lot of the students come from engineering backgrounds. But the Center pays the stipend; the Center will pay the stipend, and we don't select the interns. The companies select them from a database. So students put their bios in the database. The Center will pay for two-- And the company and the student structure the internship; it's whenever it works for them.

We'll pay for two students from a four-year college; if you take two more students from a community college, you get four interns. So it's a way of really directly building relationships between companies.

Now, I'm going to go through this quickly, but I want to give you a feel for the range because, as I said to you, this was one of our successful programs.

Some of the infrastructure grants were very basic. They were going to cities and towns to increase their bio readiness. Our bio -- MassBio -- has a program where they evaluate communities in terms of life sciences readiness, and they give them a grade. We gave a grant of \$13 million to the town of Framingham -- which had very outdated pumping infrastructure -- and that enabled them to build -- Genzyme to build a \$300 million facility there, as opposed to going to North Carolina.

A lot of money to our -- the public university.

Money to the community colleges, okay? Big interest in the diversity and the inclusion of the talent pipeline in Massachusetts. We renovated outdated labs at some of our facilities around the state. And all of these are shared -- I think that was the important word, *shared* -- because the state paid for them, no matter where they were located everyone could use them -- other academic institutions, small companies, large companies.

This is a biomanufacturing training center; it was funded -- it's in the middle of the state, in Worcester; a \$6 million grant. Industry has put \$50 million into this facility.

MS. HASSETT: Is there a cap on how much you would participate in capital--

DR. WINDHAM-BANNISTER: Up to \$10 million; that was the cap.

MS. HASSETT: Was it a percentage of the total project cost?

DR. WINDHAM-BANNISTER: No; that was our cap. (laughter)

A Center for Personalized Cancer Therapies, which is a collaboration between Dana-Farber and UMass Boston. So our giving the funding for a lot of this build-out enabled that collaboration; which is something that, for our public university, was great.

UNIDENTIFIED MEMBER OF AUDIENCE: (off mike) And this, Sue, was sort of an annual competition that you would announce, and--

DR. WINDHAM-BANNISTER: Yes; this was an annual competition. We would announce it; we would open it usually during the summer, so that the academic institutions could write their grants because they weren't worried about teaching. So everything kind of had a reason. We had an ongoing flow of work.

A grant to the Joslin Center, which enabled a partnership with Sanofi. This was the largest grant, if you can believe it, ever given to the Joslin for diabetes work; \$5 million -- it was their largest grant ever.

A bio bank for microbiome research. Where did these ideas come from? From the community. These are institutions coming to us and saying, "These are the hot trends. Massachusetts needs cutting-edge facilities in these areas."

This is in Gloucester, on the North Shore. It's an old fishing community, as you know. They have now -- with money from the Center -- just \$2.7 million -- they have a Marine Genomics Institute.

The western part of the state -- there's a big cable that runs through there; a lot of computing fire power. Four of the universities came together to build something called -- it's a mouthful -- the *Massachusetts Green High Performance Computing Center*; we gave them \$4.5 million to build a supercomputer system for research in the life sciences. Everybody can use that.

We very much helped add to the complement of commercial lab space. Young companies look to see, "Is there commercial lab space in any places for us to go?"

This is at the University of Massachusetts at their Lowell Campus. This is an incubator only for medical devices. Why is that useful? Because

about 10 miles from UMass Lowell you have a lot of big medical device companies -- Philips is there, Smith & Nephew, etc.

So all of these made sense in the context of the different regions. This is in the central part of the state, and it's very focused on health technology.

UNIDENTIFIED MEMBER OF AUDIENCE: (off mike) Who did you find to operate these various incubators and-- Who are the operators?

DR. WINDHAM-BANNISTER: Who did we find? The applicants would come with their proposals and say, "This is who is going to run these." And our team -- the advocacy group would kind of evaluate.

UNIDENTIFIED MEMBER OF AUDIENCE: Were they outsourcing the operators?

DR. WINDHAM-BANNISTER: No, no. We weren't running them, but they would come and say, "And here is the team who is going to run it" -- their bios, etc.

I think you probably know about LabCentral; this is -- LabCentral has now gotten its third grant from the Center to continue its expansion. This has become a real destination point.

UNIDENTIFIED MEMBER OF AUDIENCE: (off mike) And we just-- In Princeton, we just opened an incubator that is being run by--

DR. WINDHAM-BANNISTER: Yes.

UNIDENTIFIED MEMBER OF AUDIENCE: --BioLabs as well.

DR. WINDHAM-BANNISTER: Which is great; yes. I'm really happy to hear about that.

UNIDENTIFIED MEMBER OF AUDIENCE: Yes, it's very exciting.

DR. WINDHAM-BANNISTER: And New York has one; so they-- So they are the BioLabs model, and it is a fantastic model.

This is in -- I think I mentioned -- in Fall River, one of our old mill communities. But this made a lot of sense for them -- to have some bio manufacturing, and a place where people can come and gather.

This is down in the old Seaport District of Boston.

We didn't forget, either, that, you know, as a state we want to make people aware; we want to get kids interested. So these are grants to some of our museums for life sciences-related activities.

And it was a team effort: MassBio, MassMEDIC, the Mayors of cities and towns -- we all came together. We did this.

So very quickly, in summary: About \$5 million spent on collaborate activities; \$6 million on K through 12 programs; \$17 million on internships; \$20 million going into vo-tech high schools; \$44 million to early-stage companies; about \$50 million into translational research; \$76 million into advanced manufacturing -- again, we don't just want to do the research; \$139 million in tax incentives; and about \$400 million-- So, about \$750 million through last fiscal year; and the leverage -- over \$2 billion; so 3X.

So I'm going to stop now; and I'm sorry I didn't leave quite as much time as I had hoped.

But maybe I'll-- Should I take one or two more questions. And then I know you want to do--

MS. HART: Please; that would be wonderful.

Would someone mind getting the lights, please?

Thank you so much; thank you.

DR. WINDHAM-BANNISTER: Yes.

ASSEMBLYMAN ZWICKER: So it's -- actually, it's a tremendous success story.

DR. WINDHAM-BANNISTER: Thank you.

ASSEMBLYMAN ZWICKER: Can you go back to 2008, 2009, when you were really getting this off the ground? Can you give us some

examples of some of the greatest challenges; and what would you do differently?

DR. WINDHAM-BANNISTER: (laughter) I have to say, I would only do one thing differently; and I'll start with that.

I would very much have liked to have had the time to try and make the Life Sciences Center more self-sustaining and self-supporting. I had said I would stay until Governor Patrick left office. So he left in 2015, January, and I left in June. But I think that there really is a point at which-- I knew the risks of having a new Administration coming in; and I'm very happy that they saw enough value.

So what I think was really important -- and I actually, I'll just throw this up and you can take a look at it -- was, for me, coming out of the world of consulting and having worked with companies. I really understood what created innovation capacity; I understood what was missing in Massachusetts and what would make Massachusetts more attractive.

So I think this notion of really working very collaboratively with the stakeholders, number one, was critical; for them to see that their input was driving where the money was going.

Working closely with the legislature was very important in making sure that we were keeping tabs on metrics that mattered to them, that helped them tell the story; including them in the work that we were doing and sort of celebrating what was going on.

This outsourced decision-making, which is really what we did. The Center was basically managing this fund and managing all the investments. But the decision-making was in the hand of the stakeholders. That was critical; it created a lot of credibility.

So I think all of those-- And then I would say, first and foremost, was having an independent entity that was not a state agency, so we had a certain amount of flexibility in things that we could do. We were not subject

to the requirements that are incumbent on state agencies. Many of them we were required to meet; but most of them not.

So having a Board, having an entity that was neutral-- Even though we had a wonderful Industry Council, we had wonderful -- different kinds of academic organizations -- having an entity whose mission was to really drive that strategy and the investments was, I think, the smartest thing that we did.

ASSEMBLYMAN ZWICKER: Very quick follow-up: Were you *in* an agency, but *of* an agency? Or were you completely outside?

DR. WINDHAM-BANNISTER: Completely separate. We were in Waltham; we were in Waltham. And as I said, people were quite concerned when I said to them -- the legislature, and the Secretary's Office -- "We're going to have our office in Waltham." And they said, "Waltham? Will people know where that is?" I said, "Yes, they will. There's a lot of venture activity there; and you know, Shire's building a campus out there, and Thermo Fisher is out there, and there's actually -- there's quite a lot going on out there."

The challenges that I had, again, I think were keeping the process merit-based; really making sure that all of our constituents were coming together, were working well together; that we were listening to them, that we were responding to them.

Managing the media because, as you can imagine, you know, we were the shiny new toy of a Governor; and there was a lot of media interest in looking to -- for his detractors to defame us in whatever way they could. But we engaged so actively with the media, and we were so transparent, that eventually they became really quite big supporters; and that was great.

And I think the last thing I'll say is, understanding that we were a marketing organization as much as we were a funding organization. Our role was not just to market life sciences *outside* of Massachusetts, but *inside* of Massachusetts. It was to change the perception in Massachusetts of the

industry, of the value of the industry, of the kind of people who worked in the industry. So I spent a lot of time talking about the initiative, and how inclusive it was, and what we were doing to make sure that it was inclusive.

And creating the public will and the legislative will -- because every year the legislature had to re-up our investment fund. That's what it's called -- it's called the *Investment Fund*. We would get the tax incentives; although the Secretary of Administration might say, "You can't have \$25 million this year; you can only have \$15 million." We would get the capital money; but the legislature might say, "Given the budget, and given the surplus this year, we can only give you \$10 million."

So I was up the hill every budget season, you know; and before then, talking about this, making our case, showing the return on the investment. And we were very often a political football, you know, where one year the House would have us as their favorite thing, and so they would negotiate with the Senate, using us. "Well, all right; we'll approve the Center's money if you give us X, Y, or Z."

So I think all of us who were involved learned quite a lot about how you work with the legislature.

ASSEMBLYMAN DePHILLIPS: So I was just going to ask, again, about -- coming back to this idea of the hubbing versus a statewide strategy. Did Governor Patrick agree from the beginning that a statewide strategy -- spreading the money statewide, instead of investing it in, say, one or two hubs -- was that the vision from the start?

DR. WINDHAM-BANNISTER: It would never have gotten through the Legislature--

ASSEMBLYMAN DePHILLIPS: That's what I mean.

DR. WINDHAM-BANNISTER: --if that wasn't the vision.

ASSEMBLYMAN DePHILLIPS: So from a political strategy--
Right.

DR. WINDHAM-BANNISTER: And so my job was to figure out how to do that, given that we had a logical hub.

ASSEMBLYMAN DePHILLIPS: Right.

DR. WINDHAM-BANNISTER: And it wasn't even Boston; it was Cambridge.

ASSEMBLYMAN DePHILLIPS: Right.

DR. WINDHAM-BANNISTER: So part of my job was to figure out how do we bring life sciences outside of Cambridge, and--

ASSEMBLYMAN DePHILLIPS: And to get everyone to buy in.

DR. WINDHAM-BANNISTER: --and to buy in, and to see that they have a role to play -- that everyone does now with great pride.

And so maybe a way to think about it is even hubs and spokes. You know, little spoke areas that all feed in, you know? But everyone understands much better now what role they play; and they understand that life sciences isn't just research, and it isn't just bio and pharma.

ASSEMBLYMAN DePHILLIPS: So would you recommend that to us as we consider next steps? Because we've had this debate about where we should be: Should we be in Princeton, should we be someplace else; should we be in two places, should we be in three places?

DR. WINDHAM-BANNISTER: I would take a look at what the capabilities are of the different-- So I wouldn't make it top-down, I guess is what I'm saying. I would really look to see-- And it may be that even, if you want to say, "Look, we're a pharma hub; that's--" New Jersey is a pharma hub. But there are different areas within pharma. So now there are cell-based therapies, right? There's a lot that's going on in -- always in oncology. Maybe there are sub-groups within pharma; and different parts of the state are strong for various reasons. Maybe there's work going on at Princeton, or at Rutgers.

So again, whatever it is, it should be bottoms-up; it should really build on the strengths that are there; with the state enabling those and helping

to reinforce those, as opposed to designating and delegating. That immediately sets up a lot of competition and a lot of bad feelings. And we were very determined in Massachusetts that this would not be seen as the Boston and Cambridge Life Sciences Initiative. The public university was not happy; other parts of the state-- I mean, I started out with a lot of hostility, because people just knew that this was never going to benefit them.

ASSEMBLYMAN DePHILLIPS: Okay; got it.

MS. HART: So we do need to wrap it up; however, our hosts -- we're going to give him the final question.

Tim; please.

MR. LIZURA: And it's actually similar, I think, to the Assemblyman's line of questioning.

You had made a statement in your last -- addressing the Assemblyman here -- that you kind of knew what gaps in the marketplace you were trying to fill when you started this process.

DR. WINDHAM-BANNISTER: I began with an active listening tour. I went all over the state and I listened. So it wasn't my judgement; it was what the community told me was missing.

MR. LIZURA: So you did some sort of inventory, effectively--

DR. WINDHAM-BANNISTER: Absolutely.

MR. LIZURA: --of the assets in order to find out where your gaps were.

DR. WINDHAM-BANNISTER: Yes.

MR. LIZURA: And that was my question.

Did you document that, in a fashion?

DR. WINDHAM-BANNISTER: Yes; well--

MR. LIZURA: --in a report, or--

DR. WINDHAM-BANNISTER: I mean, loosely, loosely. I have a sheet that kind of has a list of things; and then it's like a Venn diagram and it

shows where the greatest convergence was. Because then I could go out and say, "This is what you told me we need to be doing. This is what you -- this is where you told me the Center needs to invest. This is your--"

MR. LIZURA: You, the industry.

DR. WINDHAM-BANNISTER: This is your-- You, the academics.

So I have a Venn diagram; this is what investors, and entrepreneurs, and industry, and academia -- "Here's what I heard, over and over, from you. So there were lots of other things that you were individually concerned about; but here's a very short list of things that all of you agreed -- we needed to treat as priorities for investment. And that is where we're investing."

So I could say, for year, after year, after year, after year, after year -- "Everything that we are doing, all the money we're investing is going into these areas, because this is what you told us." And then as we strengthened one, we would look for other gaps that were opening up.

MS. HART: So a great place to leave it -- at the beginning, perhaps. (laughter)

MS. HASSETT: (off mike) Sue, I'm sorry I didn't leave you enough time for next steps.

MS. HART: No, no; not at all.

Nope, we're just going to -- that will take a minute.

DR. WINDHAM-BANNISTER: Okay.

MS. HART: But I cannot thank you enough.

DR. WINDHAM-BANNISTER: It's my pleasure.

MS. HART: This, certainly, was my wildest dreams; hopefully, all of you who were in the room. So thank you so much, Sue. (applause)

DR. WINDHAM-BANNISTER: It was my pleasure; thank you.

MS. HART: I think we have our work cut out for us. (laughter)

And on that note, our next steps as a Task Force -- we are looking to publish, get our report out for early May. We will have one more meeting of the Task Force, ourselves, to look at a report and, really, the path that we'd like to move forward in terms of presenting to the Legislature, to your Committee, to the Governor.

But meanwhile, thank you so much to our audience for being here. We really appreciate it.

This is our ecosystem; many of the ecosystem members are represented here today. We appreciate your time and your investment.

Sue, thank you again. And clearly to our Task Force -- the work we're doing -- clearly, we see how necessary and important it is. And we very much appreciate all your time.

So have a great day, everyone. We'll be seeing you soon.

Thank you.

ALL: Thank you.

(MEETING CONCLUDED)