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Kraft Precision Medicine Accelerator

MEETING SUMMARY

THE TIME IS NOW:

ACCELERATING PRECISION MEDICINE THROUGH INVESTMENT

In early 2019, the Kraft Accelerator convened a roundtable with experts on impact investing and venture philanthropy, including early movers from disease-focused impact funds. Participants discussed why precision medicine needs new investment models and shared innovative models showing great promise.

KEY TAKEAWAYS

- This is a time of amazing scientific discoveries and breakthroughs.
- Traditional funding models are not sufficient for the current opportunity.
- Interest in impact investing is high, but health care impact investing lags behind.
- Innovative new funding models for drug development show tremendous promise.
- There are opportunities to build on and accelerate successful emerging funding models.
- Progress is a function of science, money, and leadership.
- Examples from organizations including Solid Biosciences, the Juvenile Diabetes Research Foundation, UBS MPM, Dementia Discovery Fund, Deerfield Management, and more

THE KRAFT PRECISION MEDICINE ACCELERATOR

aims to speed the development and delivery of therapies by improving the business processes that surround them. While oncology currently leads the way in precision medicine, therapies are also available and being developed to treat many other diseases.

The Kraft Accelerator's work is centered on four workstreams: direct to patient, data and analytics, clinical trials, and investment/venture. For each workstream the philosophy is to engage the very best people, identify the best practices and ideas, and work collaboratively to accelerate development.

On February 28, 2019, the Kraft Accelerator convened a roundtable focused on accelerating precision medicine through investment. Participants included leading experts in impact investing and in developing and implementing new health care funding models. Participants represented both for-profit and nonprofit organizations and reflected a diversity of experiences, including experience focused narrowly on one disease and broad experience across multiple diseases and even across the entire health care system.

Some of the roundtable's key themes are summarized below. A brief synopsis of each session follows.

Faculty Co-Chair Kathy Giusti, Founder, Multiple Myeloma Research Foundation, Robert Kraft, Chairman and CEO, The Kraft Group, and Faculty Co-Chair Richard Hamermesh, Professor Emeritus, Harvard Business School

KEY THEMES

- **This is a time of amazing scientific discoveries and breakthroughs.**

  As the cost of genomic sequencing has fallen dramatically and the "omics revolution" takes hold, deeper scientific understanding is occurring. This is leading to a higher success rate in drug development. The FDA is approving record numbers of new drugs and there is an explosion of immune therapy drugs. Going forward, scientific development will only accelerate.

- **Traditional funding models are not sufficient for the current opportunity.**

  While the traditional venture capital model has produced some drug discovery successes, it is not adequate to capitalize on the opportunities presented by precision medicine. This is largely because developing new therapies is incredibly expensive, costing hundreds of millions or even billions of dollars. The probability of success for any one drug candidate is low and development can take many years.

  To succeed in developing effective treatments and curing diseases requires an intense focus on a specific disease and requires scale, which provides the ability to take multiple "shots on goal" in developing treatments for a disease. However, because venture capital funds typically shy away from concentration risk, they lack the focus and scale that is necessary. Other models are necessary that leverage the expertise of venture capital while concentrating on specific diseases.

- **Interest in impact investing is high, but health care impact investing lags behind.**

  There is tremendous interest in and appetite for impact investing, especially among younger high net worth individuals. Increasingly, investors want to realize market rates of return while also making investments that have social impact.

  Today the market for impact investment is $228 billion, yet only five percent of impact investments are currently going to health care. A primary reason for the lack of impact investing in health care has been a shortage of health care-focused impact investing products. Creating impact investment products focused on precision medicine opportunities has the potential to change this. Investors would be able to invest in opportunities with the potential for attractive returns and significant impact while developers of precision medicine treatments would have greater access to capital.

Lisa Williams, Vice President, Goldman Sachs

- **Innovative new funding models for drug development show tremendous promise.**

  In just the past few years several innovative investment models have emerged that have the potential to accelerate precision medicine. Examples include:

  - A $476 million oncology fund has been created by multinational bank UBS to appeal to high net worth clients, who are investing $500,000 to $1 million dollars. VC firm MPM—which has expertise in oncology—is leveraging its domain expertise to invest these funds in private and public companies.

Andrew Lo, Professor, MIT Sloan School of Management, discussed how to bring more investment into precision medicine

  - The Dementia Discovery Fund, focused specifically on dementia and Alzheimer's, has raised $350 million from seven leading pharma companies, the Gates Foundation, and AARP. A venture capital firm is managing and investing this fund. The involvement of so many organizations has created collaboration and camaraderie in a very challenging area. While a high failure rate is expected because this space is so difficult, thus far the success rate has exceeded expectations.
  - The Juvenile Diabetes Research Foundation has engaged in venture philanthropy by launching the T1D Fund to catalyze investment in type 1 diabetes treatments. This fund has already raised $78 million, has invested in 12 companies, and is achieving its goal of catalyzing greater interest in this area from other investors and pharma companies.
  - A former venture capitalist, Neil Kumar, has raised more than $500 million from investors such as KKR to invest in a portfolio of therapies for rare diseases.
  - Deerfield management has a broadly focused $600 million health care innovation fund with a 15-year time horizon. This fund has at least 50 discovery projects at any time.

  These examples illustrate success in raising significant funding from sophisticated investors for early-stage investments—largely targeted at specific diseases, including cancer, dementia, type 1 diabetes, and rare diseases. After these funds have been raised, investment decisions are being made by subject matter experts focused on specific areas. These funds are addressing the issues of focus and scale.

- **There are opportunities to build on and accelerate successful emerging funding models.**

  After being exposed to these emerging funding and investment models, roundtable participants identified opportunities to amplify them. Several of the ideas discussed are summarized on page 10. Three ideas garnering significant interest among participants for further follow-up were:

  1. Replication of the UBS/MPM model. This model involves creation of a cancer-focused impact investing product. It provides UBS with an attractive impact investing product to offer to high net worth individuals and results in creation of a fund of almost $500 million focused on oncology, with investment decisions managed by a venture firm with oncology expertise. This model provides the scale ($500M) and the focus (oncology) necessary to succeed. Participants would like to see this model expanded so other banks and financial institutions offer disease-focused impact investing products to their clients.
  2. Expansion of successful venture philanthropy models. The venture philanthropy successes of disease foundations like the Cystic Fibrosis Foundation and JDRF are models to learn from and emulate.These foundations raised significant funding and then put these funds to use in a very targeted way to stimulate investment in their disease. This use of venture philanthropy creates the scale and focus necessary to develop treatments and cures for diseases.
  3. A fund of funds. Instead of all money going to one fund, focused on one disease, there can be multiple funds (perhaps five or 10) under one impact investing umbrella. Each individual fund would be laser focused on one particular disease, such as dementia or oncology. The umbrella fund of funds would bring scale in thinking about common topics such as data systems and gettting data into machine learning. This idea provides both focus on individual diseases and scale in dealing with broad issues like data.

- **Progress is a function of science, money, and leadership.**

  The focus of this roundtable was on accelerating investment through new funding models, and multiple presenters and participants made clear that "money makes things happen."

  Yet, while money is essential, money alone will not accelerate precision medicine. What truly moves the needle is the combination of scientific discovery, lots of money, and focused, committed, visionary leadership. One participant summarized: it is about significant financial capital and outstanding human capital.

> "It's the science, it's the leadership, and it's the money. If you can catalyze those three things, you can make a very large difference."
> Richard Hamermesh

SUMMARIES OF PRESENTATIONS, PANELS, AND REPORT OUT

HBS KRAFT ACCELERATOR OVERVIEW & WHY WE ARE HERE TODAY

Kathy Giusti, Founder, Multiple Myeloma Research Foundation, Faculty Co-Chair, HBS Kraft Precision Medicine Accelerator
Robert Kraft, Founder, Chairman and CEO, The Kraft Group

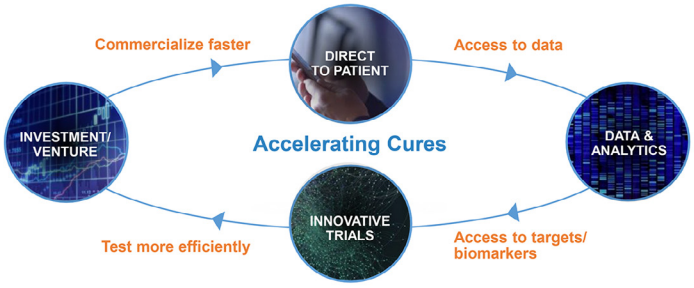
The Kraft Precision Medicine Accelerator came to be after Robert and Jonathan Kraft experienced the broken, fragmented health care system when trying to help Myra Kraft get care for ovarian cancer. The Krafts concluded they could have the greatest impact on accelerating cures for cancer and other diseases by providing funding to a business school to catalyze breakthrough business models. They initiated a charitable effort with Harvard Business School, which has the entrepreneurial leadership, resources, and ability to move precision medicine forward quickly.


Robert Kraft, Chairman and CEO, The Kraft Group

Under Kathy Giusti and Richard Hamermesh, the Accelerator has made unprecedented progress in just a few years.

Now is the best time to be working in precision medicine because the cost of genomic sequencing has fallen, the FDA is approving record numbers of drugs, and there is an explosion of immune therapy drugs. And, while oncology is the leader, precision medicine's promise extends to all diseases.

The Accelerator is focused on accelerating cures by concentrating on four workstreams: direct to patient, data and analytics, innovative trials, and investment/venture. Goals include accelerating access to patient tissue and data, accelerating access to targets and biomarkers, accelerating trials, and commercializing treatments faster.



In each workstream the Accelerator's philosophy is to bring together the best people, practices, and ideas to catalyze action. Gatherings of leaders in each workstream have occurred or will take place in the near future, and these gatherings have produced tangible results. For example, the direct-to-patient workstream brought together direct-to-consumer experts along with leaders from five large cancer organizations, representing half of all cancer patients. These organizations agreed to share data, launched a new collaboration, and have quadrupled the engagement of patients in sharing data.

This gathering was to explore various funding models to achieve significant and sustained funding for specific areas of precision medicine. Investment models include philanthropy and nonprofits, impact investing, hybrid models, and for-profit investing. Experts in each area shared insights.

Kathy Giusti knows from her personal experience as a patient with multiple myeloma what significant amounts of money can accomplish. Over 20 years, the Multiple Myeloma Research Foundation (MMRF) has raised $500 million. As a result, 10 new drugs have been approved and two or three more are likely to be approved this year. These drugs have tripled the life expectancy for patients with multiple myeloma.


Kathy Giusti, Founder, Multiple Myeloma Research Foundation, Faculty Co-Chair, HBS Kraft Precision Medicine Accelerator

Looking ahead, the Kraft Accelerator is aiming to accomplish in five years with an immune venture model what MMRF accomplished over 20 years. The Accelerator also hopes to develop models that can be replicated to accelerate cures for other diseases. Per Kathy Giusti, "Money moves things and money makes things happen."

> "This is exactly how cures are found . . . because you have great science, you bring the best minds to this business school campus, and you take the philanthropy that Robert and Jonathan Kraft gave us and make it as powerful as it possibly can be."
> Kathy Giusti

THE CASE FOR IMPACT INVESTING IN PRECISION MEDICINE

Richard Hamermesh, Faculty Co-Chair, HBS Kraft Precision Medicine Accelerator, Harvard Business School

Hamermesh emphasized, "The time is now for accelerating precision medicine through investment."

The reasons the time is now are:

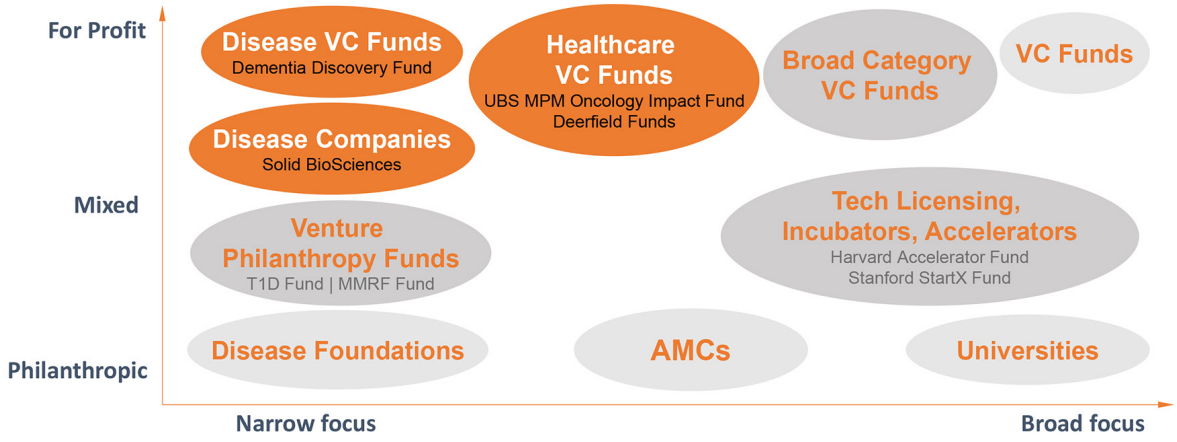
1. **Scientific advances are changing the ROI equation.** Because of deeper scientific understanding, drug development can produce a higher success rate and faster drug approval. Not every deal works, but by taking enough shots on goal, market returns can be achieved. Good returns in turn attract more investment.
2. **There is tremendous investor appetite.** Among high net worth individuals, particularly millennials, there is strong appetite for impact investing. Impact investing is defined as seeking market rates of return while having social impact. The market is estimated at $228 billion and is growing. However, currently health care only gets five percent of impact investments. More health care impact investment products are needed to meet investors' demands.
3. **Innovative investing models have emerged.** These models include venture philanthropy (such as MMRF and the Cystic Fibrosis Foundation), disease-specific companies focused on one disease (like Solid Biosciences, focused on Duchenne muscular dystrophy), and focused funds like the UBS/MPM collaboration (discussed on page 9).

The changes in the investing landscape over the past 20 years are immense. Twenty years ago, philanthropy and broad-based VC funds were the main instruments for investing in precision medicine. Ten years ago, narrowly focused venture philanthropy funds emerged, along with university-affiliated technology licensing, incubators, and accelerators.

Richard Hamermesh, Faculty Co-Chair, HBS Kraft Precision Medicine Accelerator, Harvard Business School

Today, there is a great deal of activity in precision medicine impact investing. The investment purpose ranges from philanthropy to for-profit investing, and the focus ranges from narrow to broad.

Disease Foundations are Creating For-Profit Companies and VCs are Becoming Increasingly Specialized



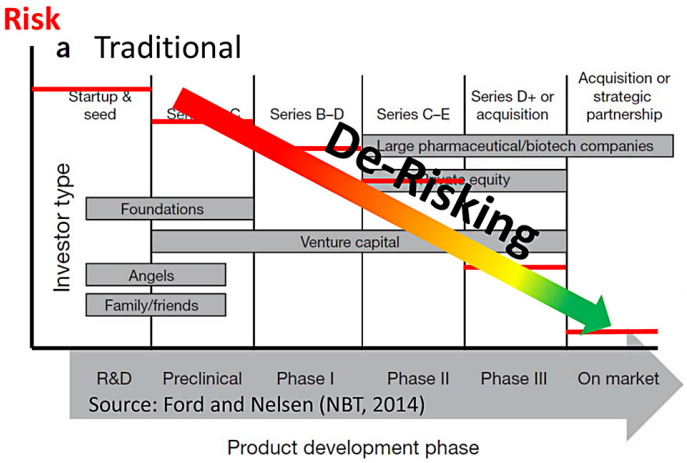
CREATING HIGH-IMPACT PORTFOLIOS

Andrew Lo, Professor, MIT Sloan School of Management

While biomedicine is experiencing a scientific revolution, finance and economics have not kept pace. Biomedicine has three unique challenges that affect investment:

1. **Developing a drug is extremely costly.** It can take hundreds of millions or billions of dollars.
2. **The probability of success is extremely low.** In oncology the success rate is about five percent.
3. **The duration is long.** Developing a drug and getting it approved can take 10 to 15 years.

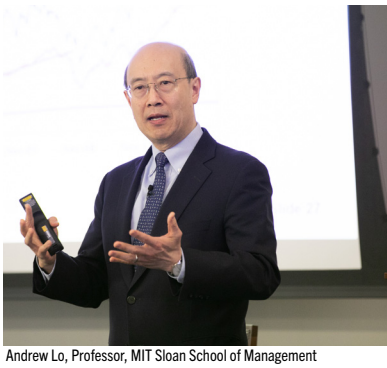
Because of these challenges, funding early-stage biomedical innovation is extremely risky. As a drug proceeds through Phases I, II, and III, the risk becomes lower, the value of an asset jumps, and money flows in.



Because investors want high-yielding, low-risk assets (as measured by the Sharpe Ratio), and because early-stage investments in biomedicine are so risky, many investors have shied away and invested elsewhere. And, while venture capital is successful for many industries and there have been VC successes in the development of individual drugs, to avoid concentration risk VCs have not typically made multiple investments targeting the same disease. As a result, this model has not developed multiple treatments or cures for specific diseases.

The challenge is bringing more investment into the space. Two ways are: 1) improving drug discovery to create even more breakthroughs; and 2) engaging in financial engineering by using all of the tools of modern finance to increase the Sharpe Ratio, thereby reducing the risk and increasing the expected return. Tools include portfolio theory, securitization, and more. Approaches include raising large funds focused on one specific disease to provide enough scale and having focus and expertise on the particular disease.

> "These are power tools that can raise tremendous amounts of money in relatively short periods of time for very focused purposes."
> Andrew Lo


Andrew Lo, Professor, MIT Sloan School of Management

The good news is that new business models are rapidly emerging. Examples include:

- **Cystic fibrosis:** The Cystic Fibrosis Foundation, founded in 1955, had been a typical disease-focused organization providing patient support and advocacy. In 1994 the CEO changed the mission to developing a drug for CF. From 1998 to 2005 the CF Foundation invested $150 million from its endowment in drug development. This investment led to the first drug for CF in 2012. The Foundation sold its investment for $3.3 billion. This investment had impact and produced an enormous return, which is now being reinvested in gene therapy to cure CF.
- **Oncology:** UBS and MTM have created an Oncology Impact Fund. UBS raises money from their clients and MTM—a VC with oncology expertise—invests it. The fund is evergreen, is allowed to invest in public companies, and returns part of its funds for early-stage research.
- **Rare diseases:** A fund run by a Neil Kumar, former health care venture capitalist, is focused on rare diseases, where success and risk are not correlated. This fund has raised over $500 million.
- **Ovarian cancer:** Ovarian cancer has been overshadowed by other cancers. A model of a portfolio of 25 therapeutics showed that if all 25 were pursued, it could make progress in treating the disease and could yield an attractive return. A fund of $250 to $500 million to pursue these ideas could have a huge impact.

PANEL: FROM NON-PROFIT TO FOR-PROFIT

Sean Doherty, Executive Chairman, Juvenile Diabetes Research Foundation T1D Fund
Lesley Solomon, Chief Innovation Officer, Dana-Farber Cancer Institute
Ilan Ganot, Founder, President and CEO, Solid Biosciences
Moderator: Bill Sahlman, Professor, Harvard Business School

Ilan Ganot, Sean Doherty, Lesley Solomon, and Bill Sahlman (from left to right)

The panelists shared their perspectives on funding models to accelerate development of treatments.

SOLID BIOSCIENCES

Solid Biosciences is a five-year-old company founded by Ilan Ganot to cure Duchenne muscular dystrophy, a terrible disease that afflicts his son and about 10,000 others in the United States. This disease results from a gene mutation. Ganot and his company are laser focused on one disease. Solid Biosciences has raised $300 million and has gone public. Ganot estimates it will take $1 billion to get a drug approved.

Ganot views drug development as a continuum that takes perhaps 20 years. It begins in a scientist's lab and ends when a patient buys an approved drug at a pharmacy. In between are multiple participants who each play a role in the value chain. He sees his role as a focused innovator and risk taker who will fail, again and again, and then hopefully succeed. Participants each need to understand their distinct role.

T1D FUND

About three a half years ago the Juvenile Diabetes Research Foundation saw two challenges: 1) fundraising was stalling; and 2) despite research on type 1 diabetes that showed excellent results, there was no commercial investment in type 1 therapies.

JDRF decided to pursue a venture philanthropy model. The result was creation of the T1D Fund. The fund's goal is to catalyze investment and commercialization in type 1 therapies. The T1D Fund initially raised $78 million from 58 high net worth individuals and thus far has invested in 12 companies, with more investments to close soon. Other investors have now joined in, including pharma companies and venture firms that had not previously invested in type 1 and are suddenly very interested in this space.

> **"The reason we are here is to attract private capital for type 1 diabetes."**
> Sean Doherty

DANA-FARBER CANCER INSTITUTE

Incredible science is taking place in Dana-Farber's labs. To get a handle on the Institute's activity, Dana-Farber ran a pipeline project. The output was a compilation of everything underway at Dana-Farber—from early stage R&D to projects close to translation. The Institute created an internal scientific review council and a business development council to vet all projects. About 100 projects were identified, 20 showed potential for translation, and three were deemed most promising.

Dana-Farber conceived of an internal philanthropic accelerator fund to support these projects. But as the Institute spoke with potential donors, these parties expressed an interest in being investors, not donors. Because people are now seeing attractive returns in biomedicine, they are looking at philanthropy differently than just three or five years ago. This is forcing organizations like Dana-Farber to reexamine its models. The Institute is also considering collaborations with partners that can help accelerate development and commercialization of treatments to get discoveries to patients faster.

> **"The only thing that's standing in between the science that's happening in our labs and new treatments and cures is funding."**
> Lesley Solomon

A participant noted that at academic laboratories, a shocking number of promising discoveries are left for dead. These discoveries have not represented large enough opportunities for big pharma and have been too risky for venture capital, and no other funding models existed. But the rise of new funding models provides hope that some of these overlooked discoveries will be pursued.

PANEL: FROM DISEASE FOCUSED TO BROAD BASED

Detlev Biniszkiewicz, Executive Partner, MPM Capital, CEO/President, Rekindle Therapeutics and NetPoint Therapeutics
James Flynn, Managing Partner, Deerfield Management
Angus Grant, CEO, Dementia Discovery Fund
Moderator: Richard Hamermesh, Faculty Co-Chair, HBS Kraft Precision Medicine Accelerator, Harvard Business School

Angus Grant, James Flynn, Detlev Biniszkiewicz, and Richard Hamermesh (left to right)

The panelists described their firms' unique investment approaches.

UBS MPM

A strong demand for impact investing by high net worth individuals led global bank UBS to provide clients the opportunity to invest in an oncology fund. UBS has raised $476 million for this fund, with most participants investing $500,000 to $1 million. This shows how much money and demand there is for these types of impact investments.

UBS partnered with MPM to manage this fund. MPM is a leading health care venture capital firm with expertise in oncology. MPM invests in private oncology-focused companies at all stages of their lifecycles. MPM also believes that its oncology expertise translates into making good investments in public companies, which is within this fund's scope. In the view of MPM's leaders, focus, talent, and culture are often overlooked keys to success. UBS MPM has already made initial seed-stage investments as well as successful investments in public companies, which resulted in payment of a dividend to investors in less than two years.

DEMENTIA DISCOVERY FUND (DDF)

The inspiration for the DDF came from a G8 meeting in London around 2013. World leaders recognized the rising burden of dementia and Alzheimer's and noted the lack of investment in this space. This led to the British government taking action to catalyze investment and research by forming the Dementia Discovery Fund. Seven leading pharma companies put money into this fund, along with Bill Gates and AARP. The fund has raised $350 million. DDF's mandate is to invest in innovative pathways.

SV Health Investor won the bid to manage this fund. The firm is building out a small team of about 20 people to oversee DDF's investments. The pharma companies that have invested have a seat at the table and serve as advisors, but don't have decision rights. Because Alzheimer's and dementia are so difficult, there is a strong sense of camaraderie among different stakeholders.

A very high failure rate was anticipated because of the difficulty of this space. While still early, thus far the failure rate has been lower than expected.

DEERFIELD MANAGEMENT

Deerfield takes a broad approach, having built competencies in all phases of the company lifecycle. Deerfield started as a public securities fund focused on health care. This focus established competencies and provided the ability to assess the environment and project probabilities. Deerfield then worked on structured finance for public companies and then for later-stage private companies. Deerfield later began to start companies and extended into discovery research.

Deerfield's approach is to be experts in health care. The 120-person firm looks out at the universe of activities to identify supply/demand imbalances. In recent years the imbalance has been greatest in discovery research. While the NIH and academia have continued to engage in discovery research, big pharma and venture capital have largely abandoned it. This has resulted in a proliferation of good ideas but a paucity of investment.

To address this lack of investment Deerfield has created a $600 million health care innovation fund. It is a 15-year fund, addressing the duration issue. To achieve favorable returns, Deerfield has a large portfolio, with at least 50 discovery projects at any time. All of Deerfield's carry from this fund goes to Deerfield's foundation, which is used to fund important experiments that are not commercially viable.

SMALL GROUP PROJECT & REPORT-OUTS

After the presentations and panel discussions, all round-table participants engaged in brainstorming discussions about different investment approaches. Comments and ideas included:

- Follow the lead of the UBS MPM model and form similar collaborations between major banks (to raise money) and venture capitalists (with the expertise to make the investments).
- Amplify the UBS MPM model by bringing together multiple financial institutions to create a mega-fund. This might entail collaboration among organizations such as UBS, Goldman, JPMorgan, Bank of America, and others. The result wouldn't be a $500 million fund; it could be a $2 billion fund.
- Explore a "fund of funds." For example, a bank such as Goldman Sachs could raise capital by taking an impact investing approach. But instead of all of this money being in one fund, focused on one specific disease, there could be multiple funds (perhaps five or 10) under one larger umbrella. Each individual fund would be laser focused on one particular disease, such as dementia or oncology. But the umbrella fund would bring scale in thinking about common topics such as data, data systems, and getting data into machine learning. This idea provides both scale and focus.
- Don't go where everyone is already going. In certain areas, such as parts of immunotherapy, there is already a great deal of investment and many trials. There is not a market failure in such an area. Instead, look for white space where $250 million could move the needle. Examples included ovarian cancer and diagnostics.
- Consider creating funds that are focused on broad areas, such as neuromuscular, but not on one specific disease. Broader funds could focus on common mechanisms across related diseases.
- Instead of focusing investments on specific diseases, invest in platforms and infrastructure. This might include investments in areas such as pooling and sharing data.
- Create a fund to support early-stage discoveries at academic research institutions, which are often overlooked and don't receive support. In a panel discussion, Lesley Solomon described the winnowing process at Dana-Farber to identify the best ideas. This sparked the idea of a fund of $100 million or more (or multiple funds) to identify and fund the best ideas from multiple academic institutions. Perhaps five or 10 institutions would participate in a selection process. Researchers could compete for funding if their centers were open to collaborating and sharing data. This is the accelerator concept on steroids. It could help de-risk promising ideas from academia.
- Learn from other approaches, such as the Harvard Stem Cell Institute's model. At this Institute, which does not typically receive NIH funds, the 1,100 scientists decide how to allocate the philanthropic capital. They work collaboratively to decide which projects, teams, and collaborations are most deserving of funding. Grants as small as $50,000 have led to breakthrough results, which have then attracted billions of dollars in investment.