CEO Life Sciences Consortium

Project Data Sphere®

Reach & Power of Project Data Sphere®

Martin J. Murphy
Chief Executive Officer
Project Data Sphere, LLC

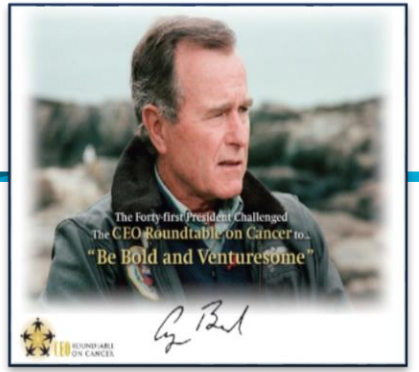
July 2018

CEO Roundtable on Cancer

CEO Roundtable on Cancer: History

- **CEO Roundtable on Cancer founded in 2001** by ***President George H.W. Bush***
- **Founding Chairman Robert A. Ingram**, then CEO of GlaxoWellcome
- **Comprised of CEOs** of diverse companies and institutions
- **Non-profit status** awarded 501(c)(3) by the IRS
- **Robert A. Bradway**, Chairman of the Board, *CEO Roundtable on Cancer;* Chairman & Executive Officer, *Amgen*

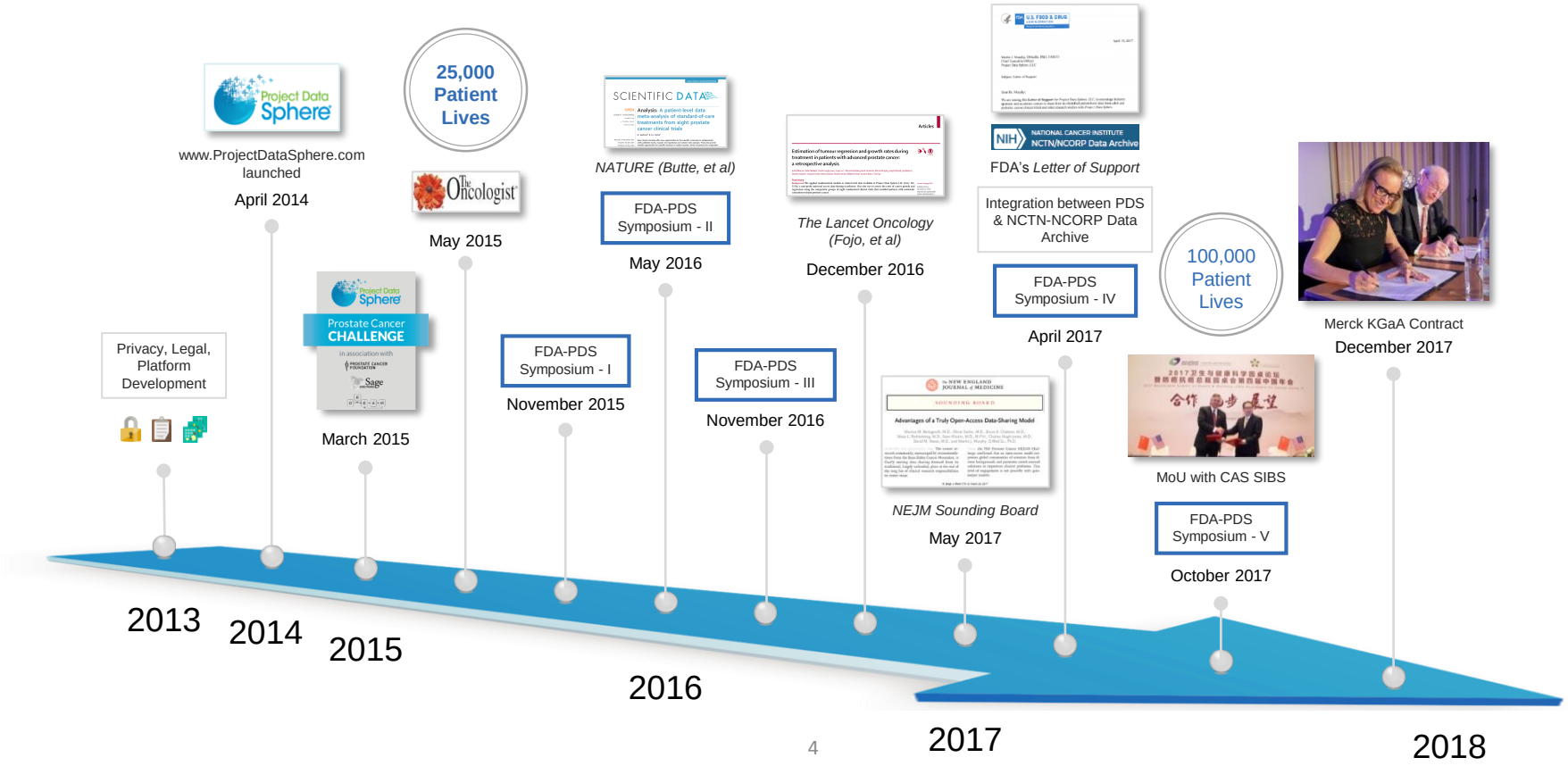
CEO Life Sciences Consortium



- LSC founded 2004
- Christopher A. Viehbacher, President, *Project Data Sphere, LLC*
- *Mission: "Bold and Venturesome"*
- *"Accomplish together what no single company might consider alone"*

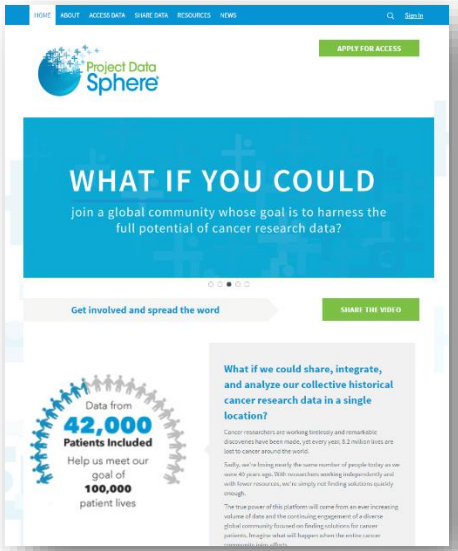
AMGEN
Boehringer Ingelheim
INSTITUTE OF MEDICINE OF THE NATIONAL ACADEMIES
Lilly
NATIONAL CANCER INSTITUTE
SANOFI
HELSINN
Celgene
FDA
MERCK
NOVARTIS
sas
astellas
EMD SERONO
Pfizer
AstraZeneca
COVANCE
EUROPEAN MEDICINES AGENCY SCIENCE MEDICINES HEALTH
THE UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER Making Cancer History®
Johnson & Johnson
Bayer HealthCare
DukeMedicine
Bristol-Myers Squibb
QUINTILES TRANSNATIONAL
Takeda

Progress and Promise



Open-Access Platform

- Launched **April 8, 2014**
- Broadly **share, integrate**, and **analyze** cancer clinical trial data
- Powerful **analytic tools free** to all users
- **Easy-to-use**, with favorable IP
- **Industry and NCI-NCTN phase III trials**
  - At launch, **comparator arm** data
  - Now accepting **experimental arm data**
- **De-identified patient data, data dictionary, protocol, & CRFs**



Project Data Sphere Metrics

As of 15July2018	
Patient lives	129,590
Comparator Arm	69,036
Experimental Arm	61,554
Datasets	153
NCI/NCTN Archive	47
Non-NCI/NCTN Archive	111
Registered Researchers	1,997
Data Downloads	12,089

Proof of Principle: Publications in Top-Tier Journals

	Publication	Author	Publication Date
1	Myocarditis Associated With Immune Checkpoint Inhibitors: an Expert Consensus on Data Gaps and a Call to Action	Tomas G. Neilan, *et al.*	In Press, May 2018 ***The Oncologist***
2	On the relationship between tumour growth rate and survival in non-small cell lung cancer	Hitesh B. Mistry	November 2017 ***PeerJ***
3	A DREAM Challenge to Build Prediction Models for Short-Term Discontinuation of Docetaxel in Metastatic Castration-resistant Prostate Cancer	James Costello, *et al.*	August 2017 ***Journal of Clinical Oncology | Clinical Cancer Informatics***
4	Advantages of a Truly Open-Access Data-Sharing Model	Monica Bertagnolli, *et al*.	March 2017 ***New England Journal of Medicine***
5	Assessment of a Prognostic Model, PSA Metrics and Toxicities in Metastatic Castrate Resistant Prostate Cancer using Data from Project Data Sphere.	Anthony Joshua, *et al*.	February 2017 ***PLOS One***
6	Estimation of Tumour Regression and Growth Rates During Treatment in Patients with Advanced Prostate Cancer: A Retrospective Analysis.	Tito Fojo, *et al.*	December 2016 ***Lancet Oncology***

Proof of Principle: Publications in Top-Tier Journals, cont.

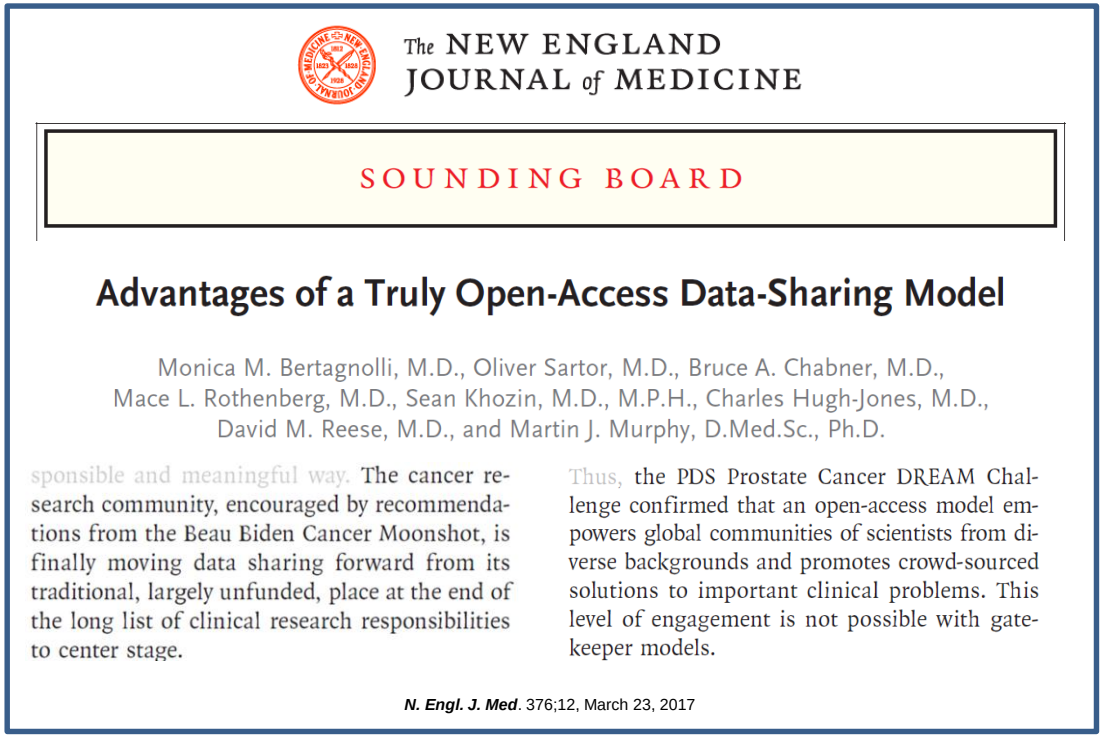
	Publication	Author	Publication Date
7	Prediction of Overall Survival for Patients with Metastatic Castration-Resistant Prostate Cancer: Development of a Prognostic Model Through a Crowdsourced Challenge with Open Clinical Trial Data.	James Costello, *et al*.	November 2016 ***Lancet Oncology***
8	"Threshold-crossing": A Useful Way to Establish the Counterfactual in Clinical Trials?	H-G Eichler, *et al.*	October 2016 ***Clinical Pharmacology & Therapeutics***
9	Predicting Survival of Pancreatic Cancer Patients Treated with Gemcitabine Using Longitudinal Tumour Size Data.	Thierry Wendling, *et al*.	May 2016 ***Cancer Chemotherapy and Pharmacology***
10	A Patient-Level Data Meta-Analysis of Standard-of-Care Treatments from Eight Prostate Cancer Clinical Trials.	N. Geifman A. Butte	May 2016 ***Nature Scientific Data***
11	Individual Patient Data Analysis of Randomized Clinical Trials: Impact of Black Race on Castration-resistant Prostate Cancer Outcomes.	Daniel Spratt, *et al*.	April 2016 ***European Urology***
12	Comparative Effectiveness of Mitoxantrone plus Prednisone versus Prednisone alone in Metastatic Castrate-resistant Prostate Cancer after Docetaxel Failure.	Angela Green, *et al*.	May 2015 ***The Oncologist***

New England Journal of Medicine
March 23, 2017

Sounding Board:

Data-sharing of cancer trial data is moving to center stage

- ***"Truly Open-Access Data-Sharing Model"* has advantages** over gatekeeper models
- **Academia, Industry & *Regulatory Authorities*** encourage and support this data-sharing strategy
- ***NEJM's Sounding Board*** invites your dialogue ... Two *Letters to the Editor received*



The NEW ENGLAND JOURNAL of MEDICINE

SOUNDING BOARD

Advantages of a Truly Open-Access Data-Sharing Model

Monica M. Bertagnolli, M.D., Oliver Sartor, M.D., Bruce A. Chabner, M.D., Mace L. Rothenberg, M.D., Sean Khozin, M.D., M.P.H., Charles Hugh-Jones, M.D., David M. Reese, M.D., and Martin J. Murphy, D.Med.Sc., Ph.D.

sponsible and meaningful way. The cancer research community, encouraged by recommendations from the Beau Biden Cancer Moonshot, is finally moving data sharing forward from its traditional, largely unfunded, place at the end of the long list of clinical research responsibilities to center stage.

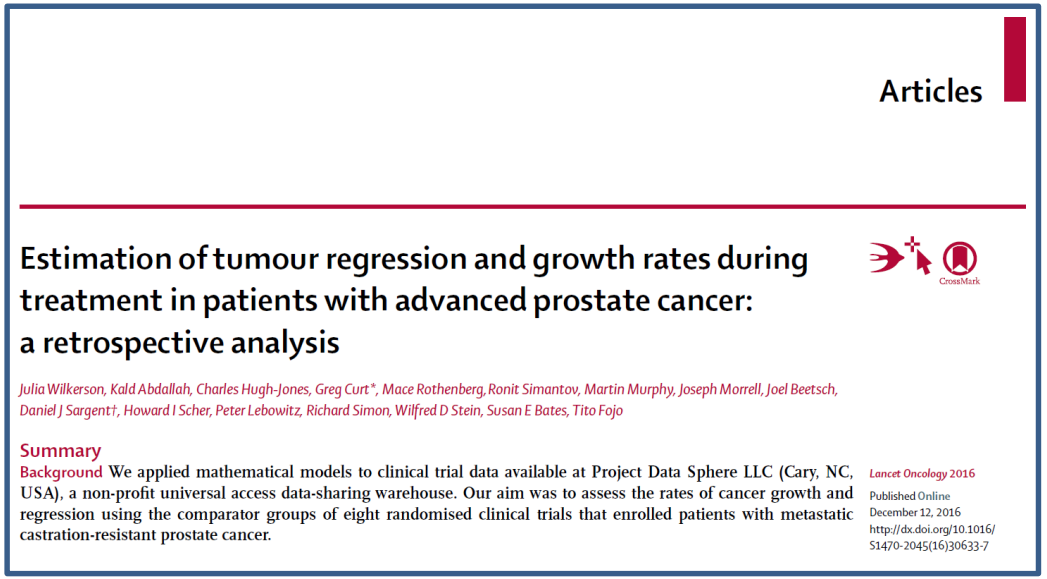
Thus, the PDS Prostate Cancer DREAM Challenge confirmed that an open-access model empowers global communities of scientists from diverse backgrounds and promotes crowd-sourced solutions to important clinical problems. This level of engagement is not possible with gatekeeper models.

N. Engl. J. Med. 376;12, March 23, 2017

http://bit.ly/NEJM_Open_Access

The Lancet Oncology

- **Growth rate of tumor differentiated docetaxel** from prednisone + mitoxantrone combination
- **Disease burden predicted overall survival at 8 months**
- **Small sample sizes** sufficient to achieve 80% power



Articles

Estimation of tumour regression and growth rates during treatment in patients with advanced prostate cancer: a retrospective analysis

Julia Wilkerson, Kald Abdallah, Charles Hugh-Jones, Greg Curt, Mace Rothenberg, Ronit Simantov, Martin Murphy, Joseph Morrell, Joel Beetsch, Daniel J Sargent†, Howard I Scher, Peter Lebowitz, Richard Simon, Wilfred D Stein, Susan E Bates, Tito Fojo*

Summary

Background We applied mathematical models to clinical trial data available at Project Data Sphere LLC (Cary, NC, USA), a non-profit universal access data-sharing warehouse. Our aim was to assess the rates of cancer growth and regression using the comparator groups of eight randomised clinical trials that enrolled patients with metastatic castration-resistant prostate cancer.

Lancet Oncology 2016

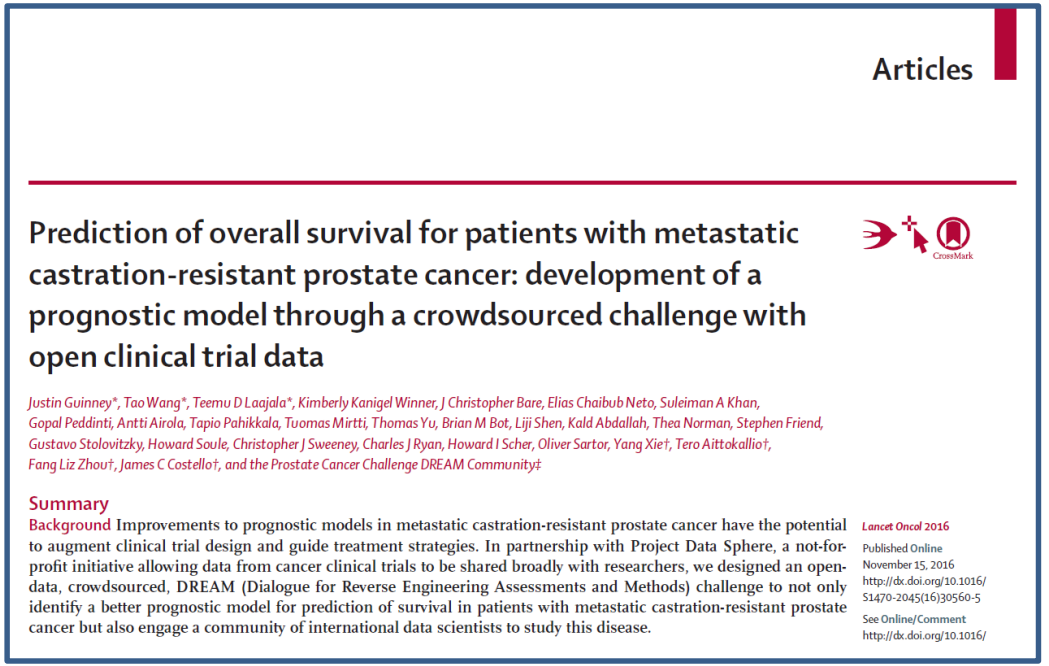
Published Online
December 12, 2016
http://dx.doi.org/10.1016/S1470-2045(16)30633-7

http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(16)30633-7/fulltext

The Lancet Oncology

- **Best performing model from crowd-sourcing was significantly superior** to current standard (i.e., *Halabi Model*)

- ***Aspartate aminotransferase was newly identified*** as important and previously under-reported prognostic biomarker



Articles

Prediction of overall survival for patients with metastatic castration-resistant prostate cancer: development of a prognostic model through a crowdsourced challenge with open clinical trial data

Justin Guinney, Tao Wang*, Teemu D Laajala*, Kimberly Kanigel Winner, J Christopher Bare, Elias Chaibub Neto, Suleiman A Khan, Gopal Peddinti, Antti Airola, Tapio Pahikkala, Tuomas Mirtti, Thomas Yu, Brian M Bot, Liji Shen, Kald Abdallah, Thea Norman, Stephen Friend, Gustavo Stolovitzky, Howard Soule, Christopher J Sweeney, Charles J Ryan, Howard I Scher, Oliver Sartor, Yang Xie†, Tero Aittokallio†, Fang Liz Zhou†, James C Costello†, and the Prostate Cancer Challenge DREAM Community‡*

Summary

Background Improvements to prognostic models in metastatic castration-resistant prostate cancer have the potential to augment clinical trial design and guide treatment strategies. In partnership with Project Data Sphere, a not-for-profit initiative allowing data from cancer clinical trials to be shared broadly with researchers, we designed an open-data, crowdsourced, DREAM (Dialogue for Reverse Engineering Assessments and Methods) challenge to not only identify a better prognostic model for prediction of survival in patients with metastatic castration-resistant prostate cancer but also engage a community of international data scientists to study this disease.

Lancet Oncol 2016

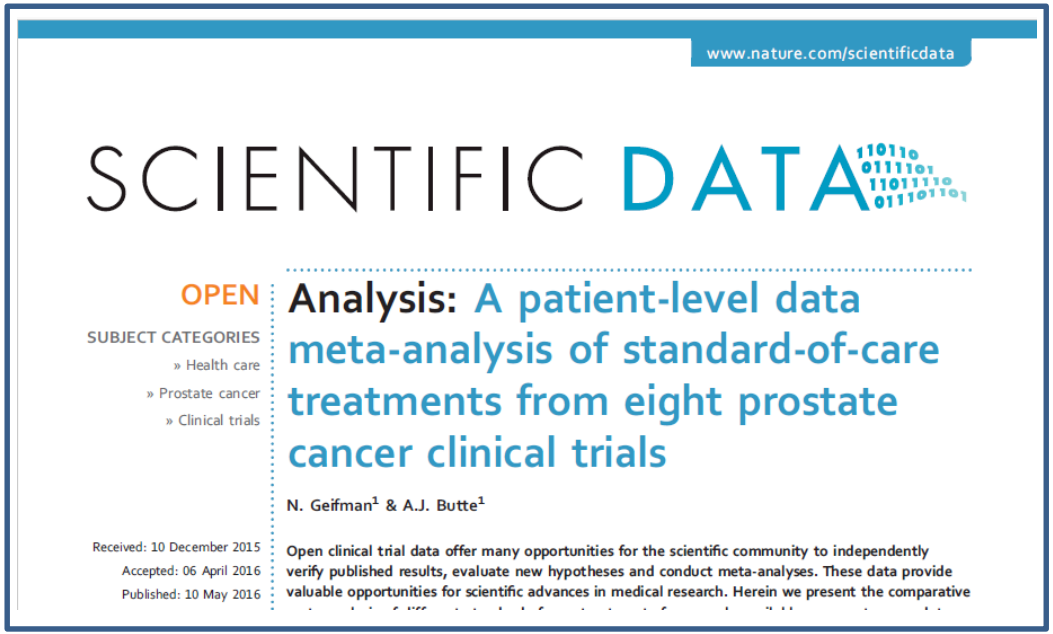
Published Online November 15, 2016 http://dx.doi.org/10.1016/S1470-2045(16)30560-5

See Online/Comment http://dx.doi.org/10.1016/

http://www.thelancet.com/journals/lancet/article/PIIS1470-2045(16)30560-5/fulltext

Nature

- Subjects treated with **combination of docetaxel + prednisone survived significantly longer** than patients treated only with prednisone
- **Survival rates are significantly higher in docetaxel + prednisone treated group** compared to mitoxantrone + prednisone patients
- Survival of subjects treated only by **surgical castration was significantly lower** than any of the other treatment groups



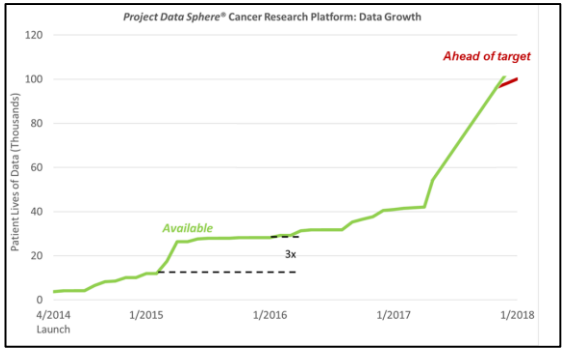
http://www.nature.com/articles/sdata201627

FDA & EMA: Vital Partners

- **FDA** meeting on ***Sharing Clinical Trial Data***, May 2012
- **IOM Data Sharing Workshop**, October 4, 2012
- **FDA Office of Hematology & Oncology Products**, May 3, 2013
- **EMA Presentation, *Hans-Georg Eichler* & *Francesco Pignatti*, et al., Canary Wharf, London**, February 19, 2015
- **Presentation to Office of Hematology & Oncology Products**, ***Richard Pazdur, Paul Kluetz, Gregory Reaman, Sean Khozin, Geoff Kim, et al*.,** June 22, 2015
- **FDA Meeting**, ***Sean Khozin, Gregory Reaman, Max Ning, Geoff Kim***, July 27, 2015
- **FDA Meeting at SAS Institute**, ***Sean Khozin***, August 25, 2015
- **FDA Meeting**, ***Robert Califf***, October 16, 2015
- ***LSC-PDS Symposium I*** with **FDA**, November 30, 2015
- ***LSC-PDS Symposium II*** with **FDA**, **NCI**, and **White House**, May 3, 2016
- ***EMA-ESMO: Single-arm trials in cancer drug evaluation,* Canary Wharf,** June 30, 2016
- ***FDA-PDS Symposium III*** with **FDA**, **NCI**, and **White House**, November 29, 2016
- ***FDA-PDS Symposium IV with FDA and NCI,*** May 2, 2017
- ***FDA-PDS Symposium V with FDA and NCI,*** October 24, 2017

Proof of Concept: *Alliance for Clinical Trials in Oncology*

- ***Disease Chairs*** identified 20 most impactful Alliance datasets
- ***Robert Wood Johnson Foundation*** $130,000 grant supports de-identification (06/2016)
- ***Alliance*** provides statistician and programmer resources
- Work started 07/2016 with ***1 to 2 datasets per month*** (final datasets anticipated by 10/2017)
- ***Alliance Foundation*** supports data science fellowship with 50% focused on PDS data research



Growing Edges (slide 1 of 2)

Global Oncology Big Data Alliance	Memorandum of Understanding (MoU) and subsequent contract between Merck KGaA and *Project Data Sphere* signed in support of 3 critical pillars: - Extension of Project Data Sphere's historic mission - Developing rare tumor registry - Investigating rare but serious adverse events associated with immuno-oncology therapies.	10Sep2017 (MoU) 15Dec2017 (Contract)
FDA / *Project Data Sphere* Symposium VI	Semi-annual scientific Symposium in collaboration with US FDA to identify and address emerging research opportunities related to data sharing and oncology.	8Aug2018
100,000th patient milestone achieved	*Project Data Sphere* cancer research platform now contains 123 studies/datasets including patient-level data from more than 110,000 patients.	2Nov2017
Immuno-related Myocarditis Workshop	First-of-its-kind collaboration to investigate rare but serious adverse events associated with emerging immuno-oncology treatments, convened by *Project Data Sphere* and aligned with details of the FDA Letter of Support.	15Dec2017

Growing Edges (slide 2 of 2)

Small Cell Lung Cancer investigations	Critical goals: - Identify changes in outcomes from standard of care treatment over time - Develop an FDA-supported external control arm for future trials	In progress
Images and Machine Learning	Critical goals: - Upgrade the PDS Cancer Platform to support images - Develop machine learning algorithms to more efficiently identify key features in tumor images	In progress

The Power of *Open Access* to *Patient-Level* Data

"Finding ways to break down siloes and allow researchers direct access to data is the only way to ensure that we don't lose twenty years worth of clinical research. The ***Project Data Sphere*** initiative is a vehicle to share data responsibly and respect the responsibility we all have to trial participants to learn from and expand the research they enabled."

- Dr. Monica M. Bertagnolli
Group Chair; *Alliance for Clinical Trials in Oncology*
Brigham and Women's Hospital
President, *American Society of Clinical Oncology*

"Data sharing through efforts such as the ***Project Data Sphere*** initiative allows **new research and new discoveries** that no single trial could provide on its own. The ***Alliance for Clinical Trials in Oncology*** is **proud to cooperate** with *Project Data Sphere, LLC* to make our data available in a responsible manner."

- Dr. Daniel Sargent, *In Memoriam*
Group Statistician, *Alliance for Clinical Trials in Oncology*

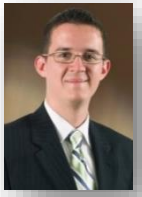
Project Data Sphere: Leadership

Martin J. Murphy, DMedSc, PhD
Chief Executive Officer
Project Data Sphere, LLC
O: +1-919.402.8750
M: +1-919.641-5304
Martin.Murphy@ProjectDataSphere.org

Bill Louv, PhD
President
Project Data Sphere, LLC
O: +1-919-531-5119
M: +1-919.949-7959
Bill.Louv@ProjectDataSphere.org

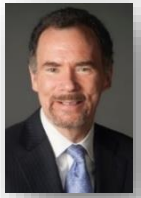
Dave Handelsman
Vice President of Development
Project Data Sphere, LLC
O: +1-919.531.2694
M: +1-919.592.0607
Dave.Handelsman@ProjectDataSphere.org

Megan Granda, PhD
Project Manager
Project Data Sphere, LLC
O: +1-919.531.0584
M: +1-919.619.6227
Megan.Granda@ProjectDataSphere.org



Joseph K. Morrell
Program Operations
Project Data Sphere, LLC
M: +1-202.746.0219
Joe.Morrell@ProjectDataSphere.org

Dave Reese, MD
Co-Chairman
Life Sciences Consortium Task Force
Amgen
O: +1-805.447.1612
dreese@Amgen.com



Mace L. Rothenberg, MD
Co-Chairman
Life Sciences Consortium Task Force
Pfizer Oncology
O: +1-212.733.5080
Mace.Rothenberg@pfizer.com

Gregory A. Curt, MD
Co-Chairman, *In Eternum*
Life Sciences Consortium Task Force
AstraZeneca Oncology

www.ProjectDataSphere.org
www.CEO-LSC.org
www.CEORoundtableOnCancer.org

CEO Life Sciences Consortium

Project Data Sphere, LLC is an independent initiative of the CEO Roundtable on Cancer's Life Sciences Consortium