Public Private Partnerships in Support of Open Science and the UN SDGs

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What is Open Science?

"Open science encompasses unhindered access to scientific articles, access to data from public research, and collaborative research enabled by ICT tools and incentives." – OECD definition

"Open science is a set of principles and practices that aim to make scientific research from all fields accessible to everyone for the benefits of scientists and society as a whole. Open science is about making sure not only that scientific knowledge is accessible but also that the production of that knowledge itself is inclusive, equitable, and sustainable." – UNESCO definition

"Open Science is the principle and practice of making research products and processes available to all, while respecting diverse cultures, maintaining security and privacy, and fostering collaborations, reproducibility, and equity." – Science.gov (US Federal Agencies) definition

"Open Science [is] an approach to the scientific process that focuses on spreading knowledge as soon as it is available using digital and collaborative technology." – European Commission definition

…and there are many more

What are the roles of science today?

“Science informs public policy and personal decisions on energy, conservation, agriculture, health, transportation, communication, defense, economics, leisure, and exploration. It’s almost impossible to overstate how many aspects of modern life are impacted by scientific knowledge.”

– Understanding Science 101, UC Berkeley

“…Creating new knowledge, improving education, and increasing the quality of our lives.”

- UNESCO

“Science can never offer a universal truth or an objective representation of the world.”

– Alexander von Humboldt Institut für Internet und Gesellschaft

“Scientific advances and technological change are important drivers of recent economic performance. The ability to create, distribute and explore knowledge has become a major source of competitive advantage, wealth creation and improvements in the quality of life.”

- OECD

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What incentives influence the practice of science?

The essence of scientific research cooperation is sharing resources for mutual benefit…

- Solving a wide-ranging problem, e.g., addressing an endemic or epidemic disease or a global pandemic, or addressing climate change, or resource restrictions
- Advancing the field of research
- Publication in academic journals and citations
- Translation of research results into real world solutions
- Exclusive intellectual property rights and maximization of patent exclusivity periods
- Obtaining current or future funding
- Competitive differentiation in research or in the market
- Professional prestige and advancement
- Product development
- Curiosity

And more…

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Great partnerships happen when core beliefs and incentives are aligned, and goals, outcomes and success metrics are clearly agreed from the outset.

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Global challenges require a universal commitment to research.

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Openness and innovation are core to Oracle

Open Source at Oracle

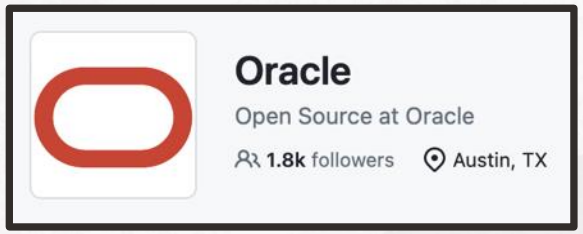
Everyone is invited.
Let’s collaborate together.

More than just code—support and training

- Open standards
- Freedom of choice
- Limitless innovation
- 900+ repositories
- 1200+ PRs/month
- 33000+ forks

Oracle Open Data

GitHub



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Data principles and standards adoption.

FAIR	CARE
Findable	**C**ollective Benefit
Accessible	**A**uthority to Control
Interoperable	**R**esponsibility
Reusable	**E**thics

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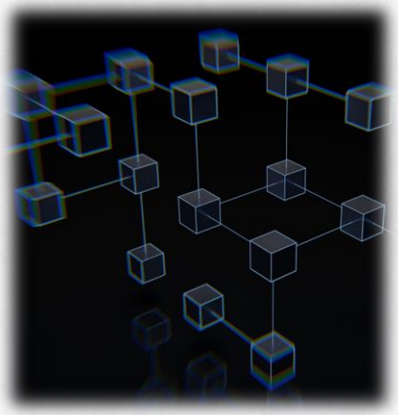
Better together.

Sharing research data is hard!



Two Working Groups

- Facilitating Open Data Publication, Access, Sharing And Collaboration
- Managing and Integrating Multiomics Data

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Considering the benefits of computational research…

In **time**…

- Problems that used to take years to solve can be solved in months or days.
- Longer time scale simulations of all-atom molecular dynamics simulations improve our ability to predict drug cardiotoxicity.

In **precision**…

- Developing and running a formal computational model requires that underlying assumptions are made explicit, and can expose potential gaps in current knowledge.
- Molecular modeling is enabling scientists to develop effective therapeutic strategies for specific SARS-CoV-2 variants.

In **understanding**…

- Researchers at NC State used computational methods to understand what causes metal oxide scales to deposit on fuel rods in nuclear reactors – dangerous and maybe impossible using traditional experimental methods.
- Enabling the integration of disparate types of datasets can yield new inferences that could not be made without computational methods.

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…and the costs of computational research.

In money…

- Lenovo ThinkSystem SR670 V2 starts at $119,596.
- HPE Cray EX Supercomputer called Crossroads cost $105 million.

In electricity…

- ChatGPT consumes between 1.1M and 23M KWh per month – matching the consumption of 175,000 people.
- Crypto-assets globally require 120B – 240B KWh per year – exceeding the total energy consumption of Australia.

In environmental impact…

- Training GPT-3 consumed 185,000 gallons of clear freshwater - enough to fill a nuclear reactor's cooling tower or produce battery cells for 320 Teslas.
- From hardware manufacturing to model training, AI startup HuggingFace's language model, Bloom, generated 51 metric tons of carbon dioxide emissions – as much as 60 one-way fights between London and New York.

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Oracle is a research partner from ideation to commercialization

“Speed is everything in research, and our colleagues at Oracle made things happen at an incredible pace… And the Oracle platform is built to be research-friendly and cost-effective so we can focus 100% on our research.”

– Dr. Imre Berger,
Professor of Biochemistry at the University of Bristol, Founder of research spinout Halo Therapeutics
& Oracle-supported researcher

FAST COMPANY

10-13-22 | ORACLE

Global health solutions: Anti-virals innovation post-COVID

University of Bristol spin-out is taking the long view on coronavirus defense

Photo credit: Imre Berger

Full story available here.

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The future of scientific research is clear

- The thirst for knowledge will continue to grow.
- The available data will continue to proliferate.
- Advanced AI will unlock untold possibilities.
- Computational power will continue to drive discovery.
- Environmental costs and risks will continue to be a concern.
- Research sustainability will be a growing challenge.
- Research relationships will be increasingly complex.
- Research efficiencies will be essential.
- Collaborative partnerships and ecosystems will become greater necessities.

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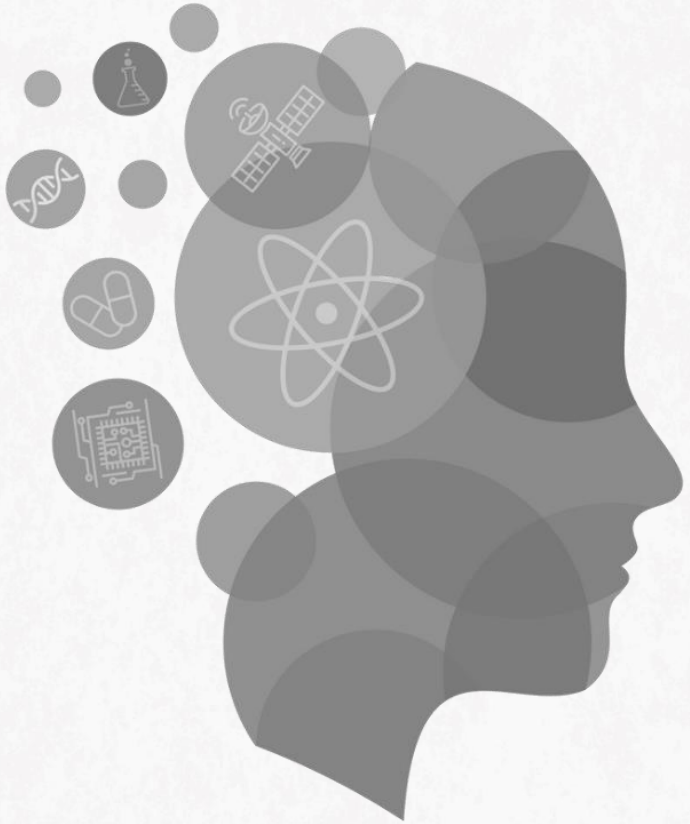
Scientific partnerships advance the greater good.



Research, Policy, and Transformative Change

- Data drives research, and research drives innovation.
- Computational methodologies accelerate results.
- Collaborations across open research ecosystems enable solutions to wicked problems with wide impact.

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