DRAWDOWN

Drawdown Model Platform
Concept Proposal / Feasibility Assessment
May 16, 2018

1. Background

Drawdown is the point in time when the concentration of greenhouse gases in the atmosphere begins to decline on a year-to-year basis. It is the prerequisite for restoring our natural carbon cycle and reversing global warming.

Project Drawdown is an ongoing research and communications organization that assesses, maps, models, and describes the potential of the most substantive solutions to achieve drawdown over the next 30 years. It is a collaborative effort of over 200 researchers, policymakers, businesses, thought leaders, and organizations developing a model to enable action and implementation throughout the world. In 2017, the results of our initial study were published in *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming.*

Our aim is to further democratize and extend this model and approach. We work with partners to help seed replications and the expansion of the model in-place, to nurture and support a thriving ecosystem based on self-organizing, networked initiatives globally.

Central to this effort is the **Drawdown Model Platform.** This online community brings together partners working on research and actions that help to achieve a shared vision of drawdown becoming an organizing principle for worldwide efforts to reverse global warming.

Combining an integrated quantitative software package, state-of-the-art collaboration tools, and engaging user interface design, the Drawdown Model Platform will serve as a dynamic system to develop the model across regions, localities, and sectors. It will be the first step to building a networked global ecosystem of drawdown regional and local hubs, each with its own relevant drawdown model and coalition of solution researchers and implementers. With Project Drawdown and the software tool connecting these hubs, research methodologies will be continually refined, solutions implementation accelerated, and stories surfaced.

2. Project Description

The online software tool we envision will have two interconnected components:

1. **Integrated modeling software.** The Drawdown Model is a set of three core models and 80 supporting Excel documents. The methodologies, data points, and calculations are internally consistent. The software will automate those Excel documents and add geolocation functionality. The software will be built so the models can evolve over time through collaboration and validation of updated data.

2. **Multilayered online collaboration platform.** The platform will be a place for researchers, implementers, and decision makers to communicate with each other about the Drawdown set of models and supporting data and calculations, and share their work and stories. The platform will support collaboration efforts across a growing network of partners from various fields that include research, finance, and implementation.

3. Product Functionality

The envisioned core functions of the Drawdown Model Platform:

1. **Model customization.** The software tool will enable users and contributors to upload fresh data, develop new methods, and propose new solutions. Rankings of solutions can be adjusted and/or reordered based on new data, allowing us to better measure and map progress toward drawdown.

2. **Data stewardship.** Regional partners will vet and validate the data and methods introduced, then incorporate them into the Drawdown models. Once data is approved, it will be published throughout the research community via the model platform.

3. **Collaborative ecosystem.** Within the ecosystem created by the model platform, users and contributors will be able to connect and communicate with others interested in the same subject area and collaborate on specific initiatives.

4. **Decision-support tool.** The tool will enable users to tailor existing information and contribute new data to support decision making. It will assist users in localizing global data to deliver information within any desired boundaries, e.g. at national, regional, or local scales.

5. **Expanded metrics.** The tool will incorporate data beyond greenhouse gas emissions and financial costs and savings. Users will be able to evaluate data in relationship to ancillary inputs such as earth systems feedbacks, policy and financial mechanisms, technological developments, educational initiatives, economic indicators (such as jobs), ecosystem services, human health and well-being, and environmental health.

6. **Real-time data integration.** As new technology develops, the tool will have the capacity to integrate data from external sources, such as greenhouse gas emissions sensors. For example, technologies are being developed that can collect real-time information on current greenhouse gas emissions, GPS mapping of biomass cover, and soil sensors measuring organic soil carbon in terrestrial biomes. This will enable regional models to provide real-time feedback on the success of those solutions as they are implemented.

4. Development Principles

Built off what already exists.
Leveraging existing tools not only makes the project more cost-effective, it helps the democratization of the platform — people will feel comfortable using it because it will feel familiar. For a discussion of existing tools that can be leveraged, see section 10 below.

Freely available.
The platform will be open-sourced and fully documented so it can be replicated. It will be web-based and easily accessible, allowing anyone to download and develop the models independently or to develop tools through an application programming interface (API).

Collectively maintained.
The platform and models will be objective and independent because individuals and institutions are invited and encouraged to contribute data, methods, and expertise to the core model and platform. These inputs will be incorporated via data management and validation protocols managed by regional partners (see "stewards" in section 5).

Developed and updated over time.
We will continue to use an agile development approach, enabling us to learn as we go. We envision developing the core functionality first, and then adding more advanced inputs and analysis later.

5. Users and Contributors

Built on the principles of collective impact, the Drawdown research program works with partners to assemble, contribute, develop, evaluate, and disseminate the work we produce together. Central to this effort is creating a system of distributed, networked management of the platform. The metaphor of a terrestrial ecosystem can be used to visualize the interplay between users at local, regional, and global levels.

To date, 23 institutions have expressed interest in partnering with Project Drawdown to further this effort. Those include: Penn State and Georgia Tech in the United States, TERI School of Advanced Studies in India, and Australian National University in Australia.

The primary roles for the research platform are listed below:

Global Model Steward. Project Drawdown created the original global model framework and conducted the first phase of research and data collection. This global data, modeling, and analysis represents the foundation of the platform from which ongoing research at regional and local scales will grow. Managed and maintained by Project Drawdown, the global model will serve as the core framework and aggregation tool across the system.

Sector Hubs. Industry-specific actors will use global, regional, and/or local data across sectors. Partners are already forming sector-based hubs to evaluate the built environment, health outcomes, land use, agroforestry, and ocean solutions. Sector hubs will work directly on refining and developing the global model's capacity to evaluate solutions within sectors.

Regional Hubs. Countries, states, and regions will use the Drawdown model to inform their own place-based research initiatives. Research and model developments conducted will be integrated through the platform to inform the global model, while allowing place-based analysis across common biophysical and socioeconomic contexts.

Local Contributors. Nonprofit organizations, public agencies, businesses, and individuals will use the regional and/or global research to inform decision making. In addition, they may collect their own data and/or contribute local observations to the tool. Their efforts will branch from regional research; what they learn will feed back into the tool, enriching the ecosystem.

Users: When the platform is operational, decision makers will use the tool to access data for policy creation, financial investment, business development, urban planning, and individual decisions.

Role	1. STEWARD	2. CONTRIBUTOR	3. USER
Function	Project Drawdown; Regional Hubs; Sector Hubs	Researcher, practitioner	Decision maker — city planner, business person, investor, educator, policy maker, etc.
Action	Review data and update platform based on submissions by contributors and users	Collect data in the field, and add it to the platform	Input certain characteristics/ criteria to generate assessments

Data and assessments created from contributors and users via the integrated modeling software, and the results from real-world actions and the implementation of solutions in local areas fostered by the online platform, will be fed back into the tool. In this way, models, methodologies, learnings, and stories will be kept current, made more robust, and ultimately prove meaningful and useful to people as they become the agents to achieving drawdown.

6. Information Flows

Information flow within the system will be multidirectional as additional data, methodological improvements, and knowledge sharing among contributors and users is generated and incorporated from local, regional, sectoral, and global contexts.

While the platform software will be open sourced allowing developers to download and independently develop discrete models, the Drawdown Model Platform will require consistent, enforced information management and validation protocols across scales to ensure the system can successfully maintain multidirectional information flow. Regional and sector hubs, and Project Drawdown will act as stewards of these protocols with approved additions being incorporated across the Platform.

Anticipated information flows include but are limited to: **quantitative data** (e.g. measurements of current adoption, capacity factors, sequestration rates, etc.); **methodological changes** (e.g. improved methods of estimating market growth or adoption rates, mapping new economic indicators, etc.); and, **professional expertise** shared in a forum setting (e.g. specific knowledge on solutions, systems, data science, etc.).

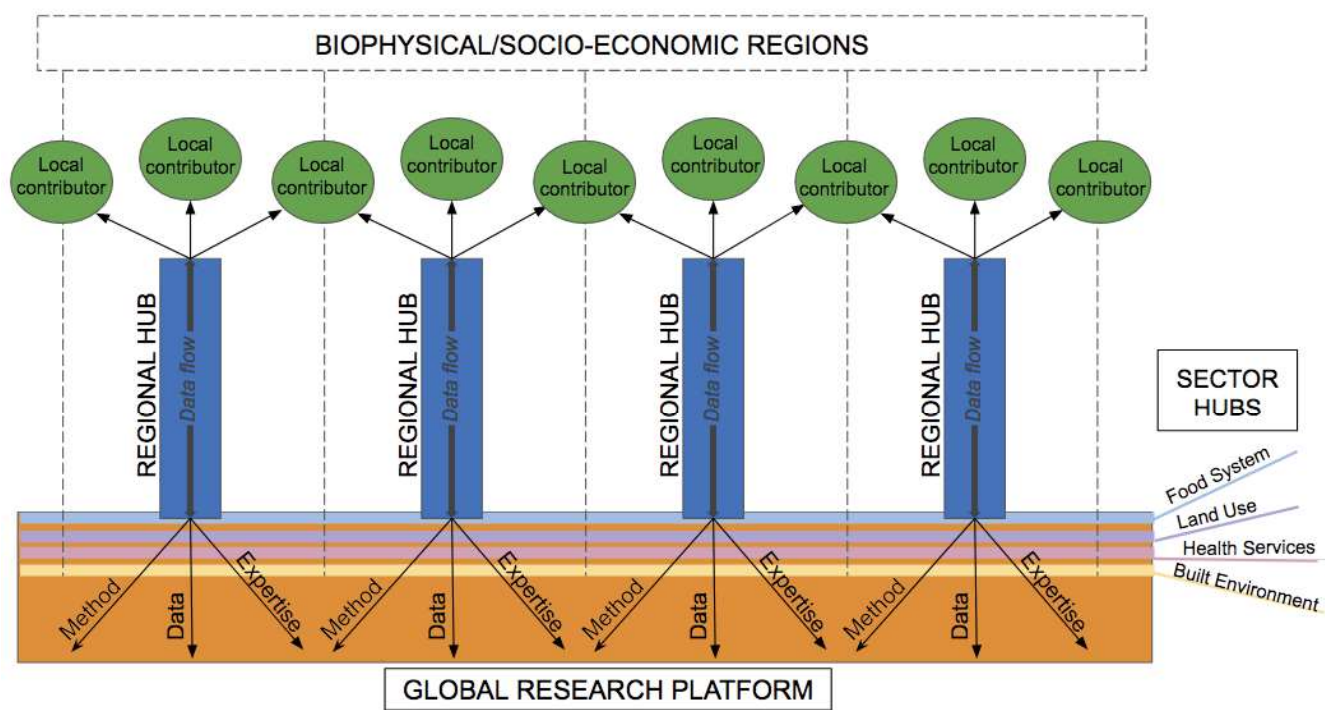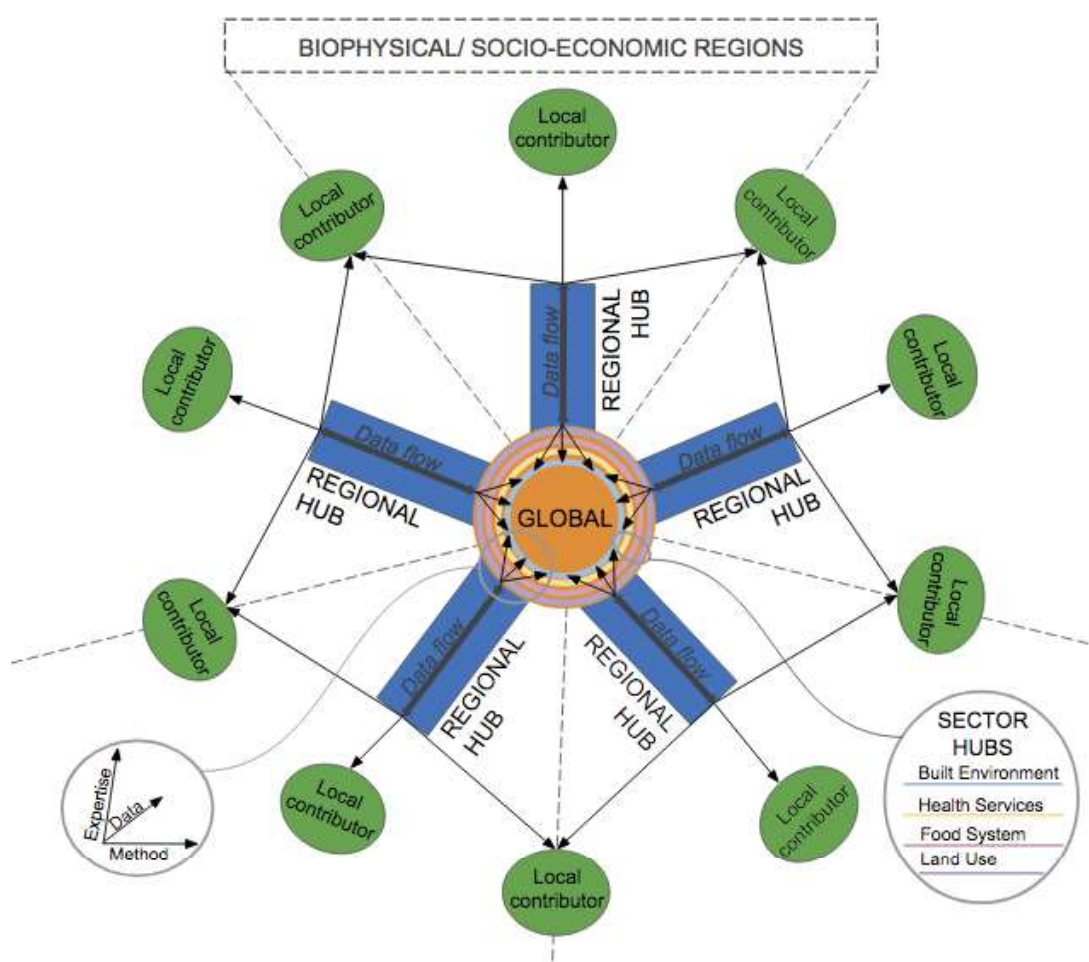**Figure 1: Drawdown Model Platform Schematic, representation of information flow**

Figure 2: The diagram can be viewed as a circle to better visualize the interconnectivity.

7. Desired Features

The features of the software tool fit into three categories:

1. **Data/models** are the core of the tool. The modelling effort includes the models themselves, and the datasets on which they are built.
2. **Collaboration** and communication tools wrap around the modelling effort.
3. An intuitive **Graphical User Interface (GUI)** enables users to interact with the data based on the unique needs of their role — steward, contributor, or user.

Category (Theme)	Features
1. Data & Models	1A. Upload new content: research results, new solutions, new models 1B. Adjust rankings of solutions based on new data 1C. Provide sandbox for users to play with data and models 1D. Upload and integrate new content areas i.e. earth systems feedbacks (greenhouse gases in the atmosphere and soil organic carbon levels from soil sensors), policy and financial mechanisms, technological developments, educational initiatives, economic indicators (such as jobs), ecosystem services, human health and well-being, and environmental health 1E. Automatically integrate real-time information from earth system sensors (GHG sensors in the atmosphere, GPS mapping of biomass, and soil sensors measuring soil organic carbon in terrestrial biomes)
2. Collaboration	2A. Anyone can join the platform and create a profile. 2B. Level of permissions within the site assigned based on role: Evaluator, Contributor, User. 2C. Members of platform can communicate with each other by sending messages — to individuals, sub-groups, and entire membership. 2D. Members can collaborate on specific projects. 2E. Content submitted by Contributors and Users can be vetted by Evaluators before publishing.
3. User Interface	3A. Enable localization of data by country, region, or customized local area 3B. Enable users to input specifications to tailor outputs 3C. Create dynamic, interactive visualizations of progress toward drawdown overall and by solution and geographic area