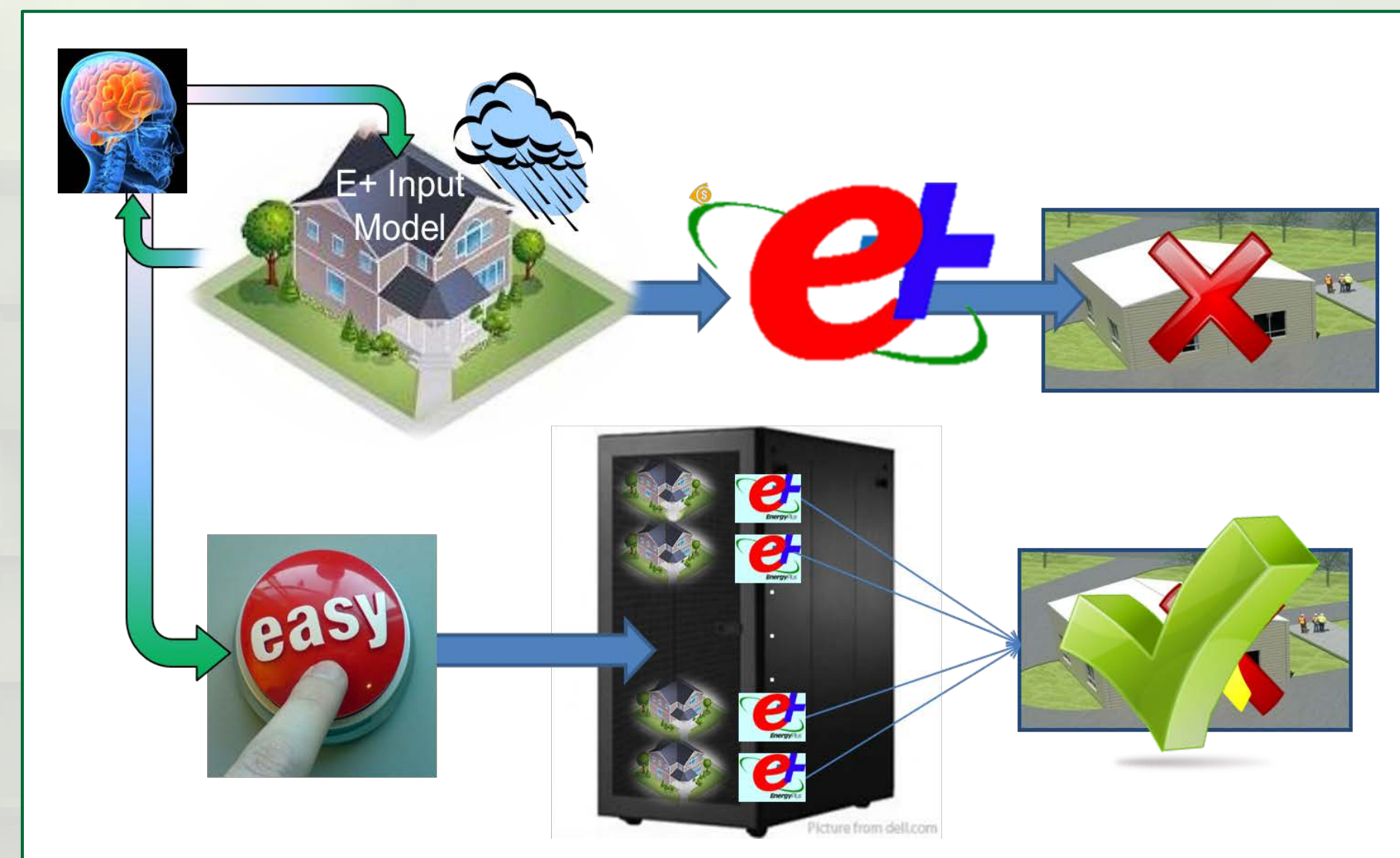# Interactive Web Design through Survey and Adoption of Modern Web-Technologies

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## Autotune

Current building energy models (BEMs), using EnergyPlus or other simulations, are unreliable because they have to constantly be calibrated to match actual energy usage data. Currently this is a very costly method because it requires considerable manual effort by experienced skilled professionals which can also be imperfect, non-repeatable, and non transferable. The Autotune project is developing a methodology for automated BEM tuning methodology creates reproducible measured data by selecting best-match input parameters. An autotuning methodology would significantly reduce the costs of building energy retrofit projects, extend their reach into smaller buildings, and improve the energy savings measurement and verification for performance contracting and other purposes.

## Drupal 7 CMS

Drupal is an opens source content management system (CMS) that is developed and maintained by a community of 600,000+ users and developers . This means that Drupal is constantly being enhanced to maintain it as a cutting-edge platform that supports the latest web-based technologies available.

The Drupal 7 content management offers many modules and tools that simplify creating complex functions and user interfaces and providing one of the best security systems. Using these features a web portal was created the provided clear user privileges and permissions distinctions.



Traditional model tuning vs "Autotune". The Autotune project is developing a methodology for automated BEM tuning methodology creates reproducible measured data by selecting best-match input parameters.
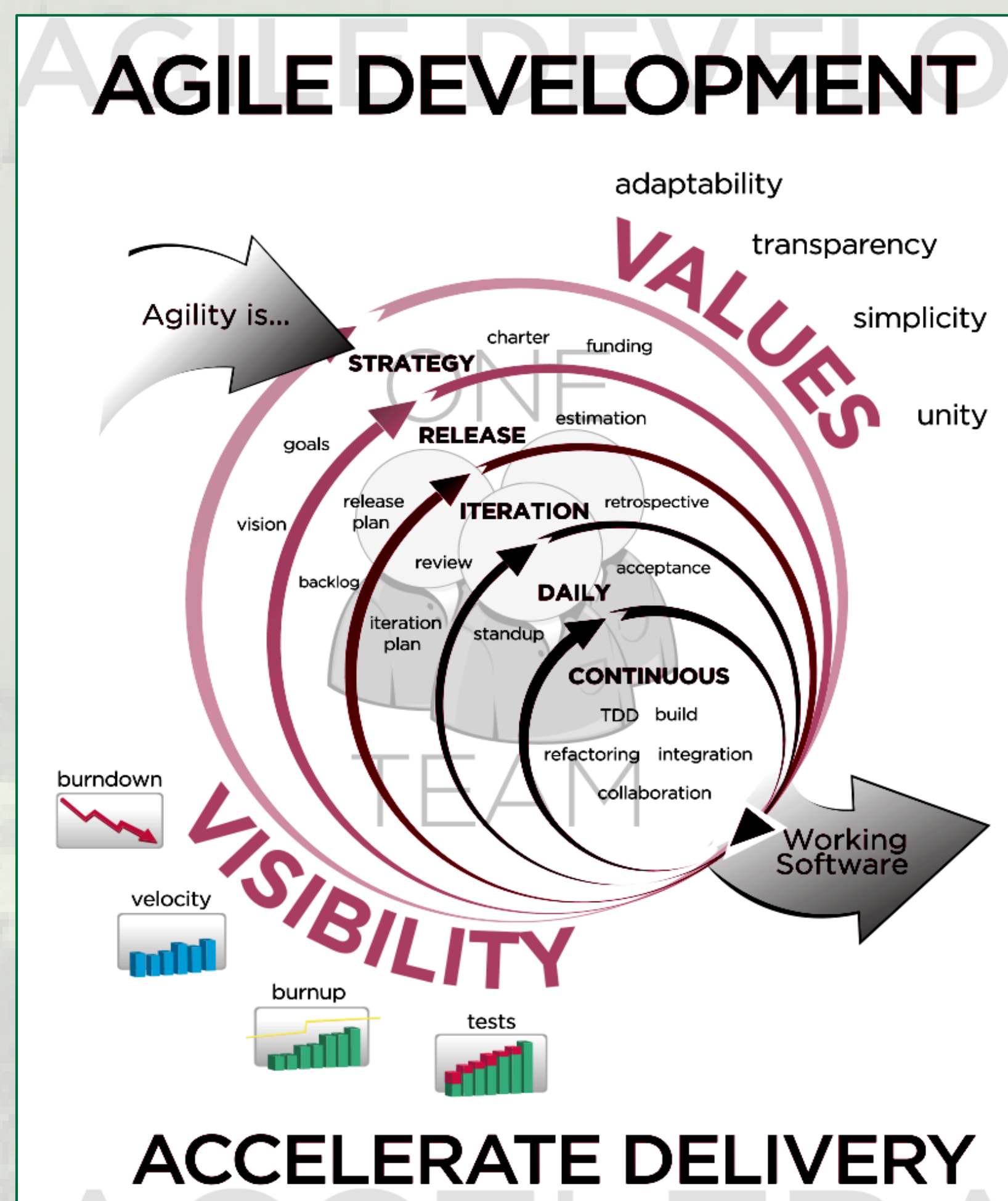
## Autotune Web-portal

Using the Drupal 7 system, a web portal was created providing public access to the simulations database. One of the many features of Drupal is the availability of many community built themes that cater to every style. Most themes also include a starter kit the provides the same features available in the original theme without any of the formatting or style. This allows the developers to create their own custom styles while taking advantage of features such as fluidity and adaptability.

The different modules, security features, and form application programming interface (API) provided a perfect combination to create an interactive and fluid user interface for the simulations data. We were able to create a web portal that would share the results of energy simulations in a safe and regulated manner whilst providing the best flow of information possible.



The development of the website (above) followed the Agile Software Development (left) module in which the features within the website evolved over time as technologies were implemented as discussed in weekly meetings and tracked in Pivotal Tracker (top).
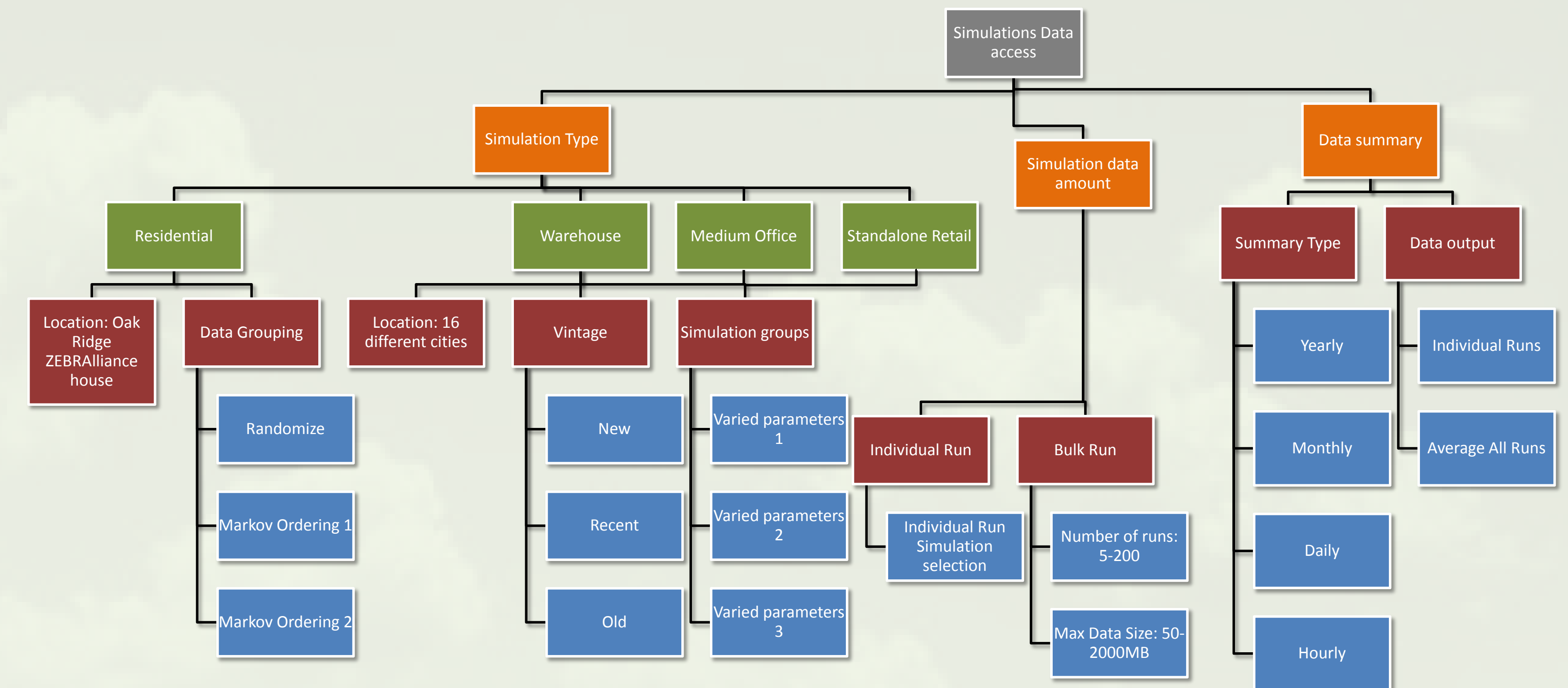


Registered users gain access to the form API which allows them to request different simulations data. The flow chart above demonstrates the different steps and options available. They have the options of selecting one of four simulation types: Residential, Warehouse, Medium Office, and Standalone Retail. Users then have the option of selection the amount of data runs they want along with how they want the data summarized as shown above.

## Web Technologies

### LiveConnect
LiveConnect is a web browser feature that allows Java JavaScript software to intercommunicate within the same webpage or different web pages. In this instance LiveConnect was used to allow to register and login using their Facebook accounts. This was utilized using a Drupal for Facebook module that integrates Facebook user information with the website user.

### KinectJS
KinectJS is an HTML 5 Canvas that operate using a JavaScript library that adds 2d context by enabling high performance path and pixel detection for webpage applications. KinectJS provides a canvas that can be custom built to include object detection, movement and interaction. By using the canvas element lines, objects, picture, and text can interactively be added to any webpage.

### JQueryUI
JQueryUI is a library of JavaScript elements that has low level DOM manipulation of UI elements and provides object interactions, widgets, and utilities. Some examples of the UI elements include date picker widget, progress bar, slider, accordion, tabs, and adding properties like draggable, sortable, resizeable, etc.

### KnockoutJS
KnockoutJs simplifies dynamic JavaScript Uis by applying the Model-View-View-Model patter. This JS library adds key concepts such as declarative binding, automatic refresh, and dependency tracking to provide high-level DOM manipulation of UI elements . In KnockoutJS complexity can be scaled up without having to introduce inconsistencies.

### Open Access
Using Open Access a set of user permissions and privilege profiles were created that allow different levels of access to the website. Using these profile made it easier to apply the permissions to users by simply adding them to a certain profile.

More information and data access at http://autotune.roofcalc.com

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