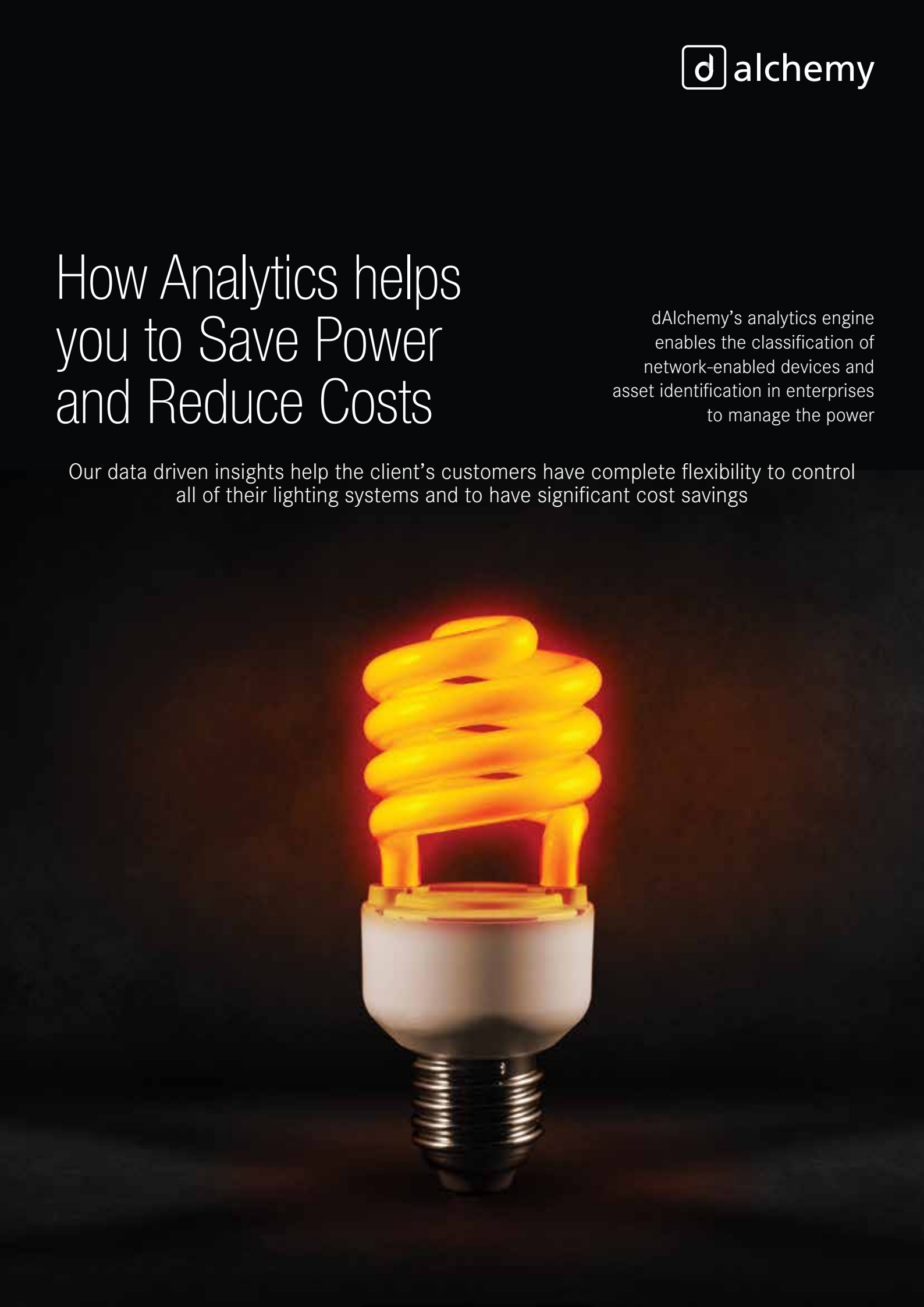
dalchemy

How Analytics helps you to Save Power and Reduce Costs

dAlchemy's analytics engine enables the classification of network-enabled devices and asset identification in enterprises to manage the power

Our data driven insights help the client's customers have complete flexibility to control all of their lighting systems and to have significant cost savings



With energy consumption of residential and commercial buildings steadily increasing over the years, there is a realization that many buildings consume more energy than required due to various reasons such as – poorly maintained equipment, faulty fixtures and incorrectly configured control systems. Data science techniques are now used to understand performance anomalies and their impact on one's business.

ABOUT THE CLIENT

The client is in the business of Internet of Things (IoT) based energy optimization. Its mission is to help its customers reach long-range sustainability goals while saving money and increasing efficiency. With its first-in-class sensor and analytics platform, the client provides smart energy solutions for commercial environments, saving customers up to 90% in energy costs.

The client has highly advanced digital sensors built into its lighting fixtures. These sensors can take action on lighting needs in real-time since they are capable of occupancy/vacancy detection and daylight harvesting.

THE CHALLENGE

Since the client is in the business of energy optimization, its aim was to be able to accurately identify its products or fixtures that were malfunctioning. This would help the client to either remove those particular products from its portfolio or improve those products to ensure that energy consumption was optimized.

THE SOLUTION

Through IoT sensors, the client was able to get data sets related to energy consumption – this data had to be pre-processed and analysed. dAlchemy's team of data scientists, data analysts and senior statisticians put their heads together and proposed the solution for the client's problem. The solution involved generation of an open source software based application which was developed for detecting and dash boarding anomalies in energy consumption in corporate workspaces.
The dAlchemy solution involved initially plotting multiple distributions across various parameters using the multi variate linear regression model. Based on these distributions, a prediction model was created for each of around 22 parameters related to the energy fixture. The real value based on heuristic data was compared with the predicted value. If the difference between these two values, which was the error, was too high, then that particular value was considered an outlier. The outliers were then removed from the data set. This process was repeated for each of the 22 parameters.

Using the multi variate unsupervised clustering model, segments of similar anomalies (like different voltages) which had different signatures were created. For each of the 22 parameters, an anomaly score was calculated. When the anomaly score was above or below a particular threshold – that parameter was considered anomalous. After following these steps, if the fixture was found to be anomalous, the information was given to the client. The feedback from the client – whether the fixture and the parameter was anomalous or not, was fed back into the model that was created. This was done in order to constantly improve the model to detect anomalous values in real time.

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For more information
Contact your account executive to learn how we can help you accelerate your business success.

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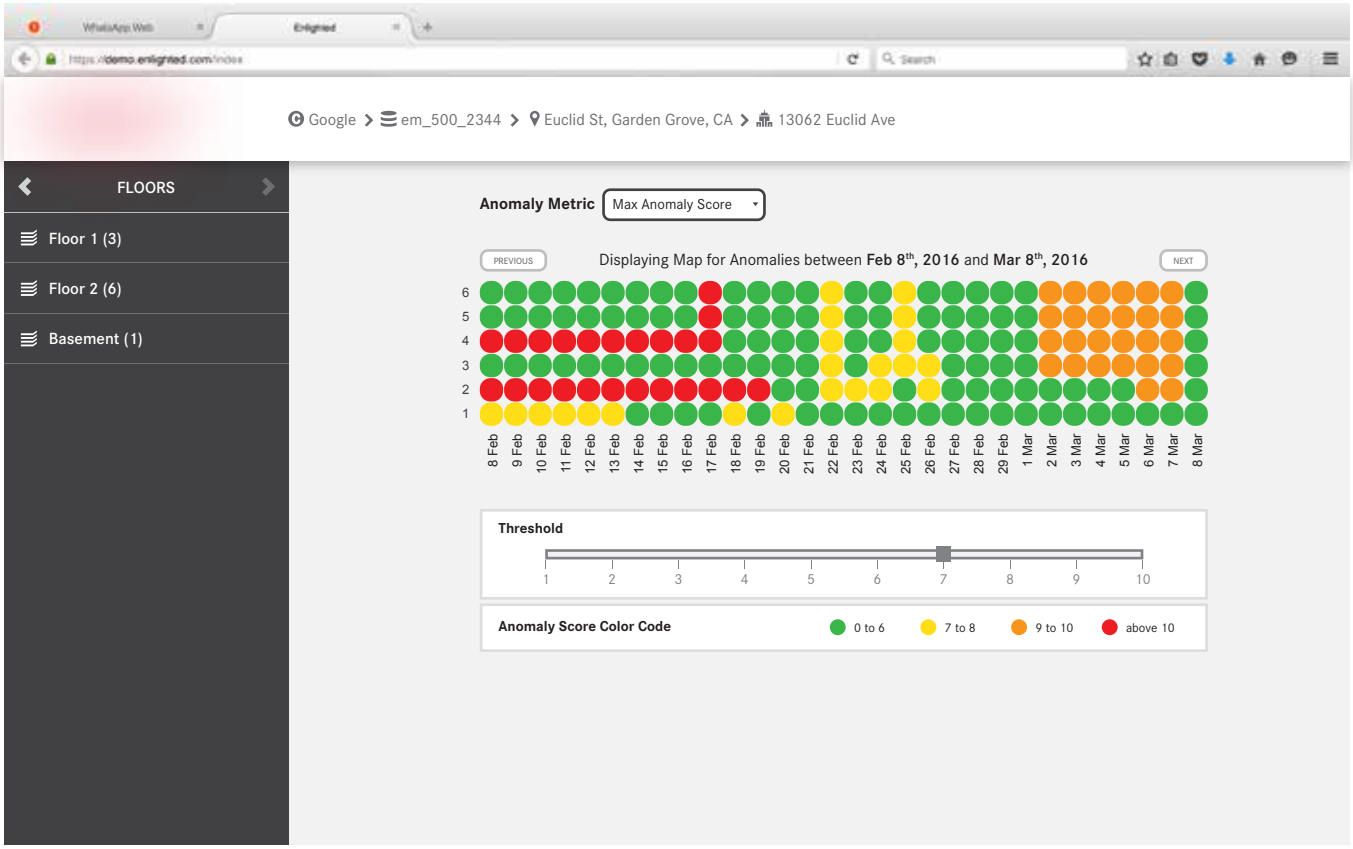

THE BENEFITS

The client was able to get the exact information that it needed, regarding faulty fixtures, without being inundated with unnecessary information. This was useful for building energy management systems to save power and reduce operating cost and time by not having to detect faults manually or diagnose false warnings. This in turn helped the client's customers have complete flexibility to control all of their lighting systems and to have significant cost savings.

Anomaly detection can also be used for multiple applications such as, intrusion detection, occupancy detection and crowd monitoring.

THE PROCESS

dAlchemy followed the CRoss-Industry Standard Process for Data Mining (CRISP-DM) Methodology for carrying out this project. CRISP-DM methodology is based on the practical, real-world experience of how people conduct data mining projects and it is described in terms of a hierarchical process model, consisting of sets of tasks described at four levels of abstraction (from general to specific): phase, generic task, specialized task, and process instance.

The following figure shows the six phases of the CRISP-DM reference model. Moving back and forth between the different phases is always required. The outcome of each phase determines which phase, or particular task of a phase, has to be performed next. The arrows indicate the most important and frequent dependencies between phases.

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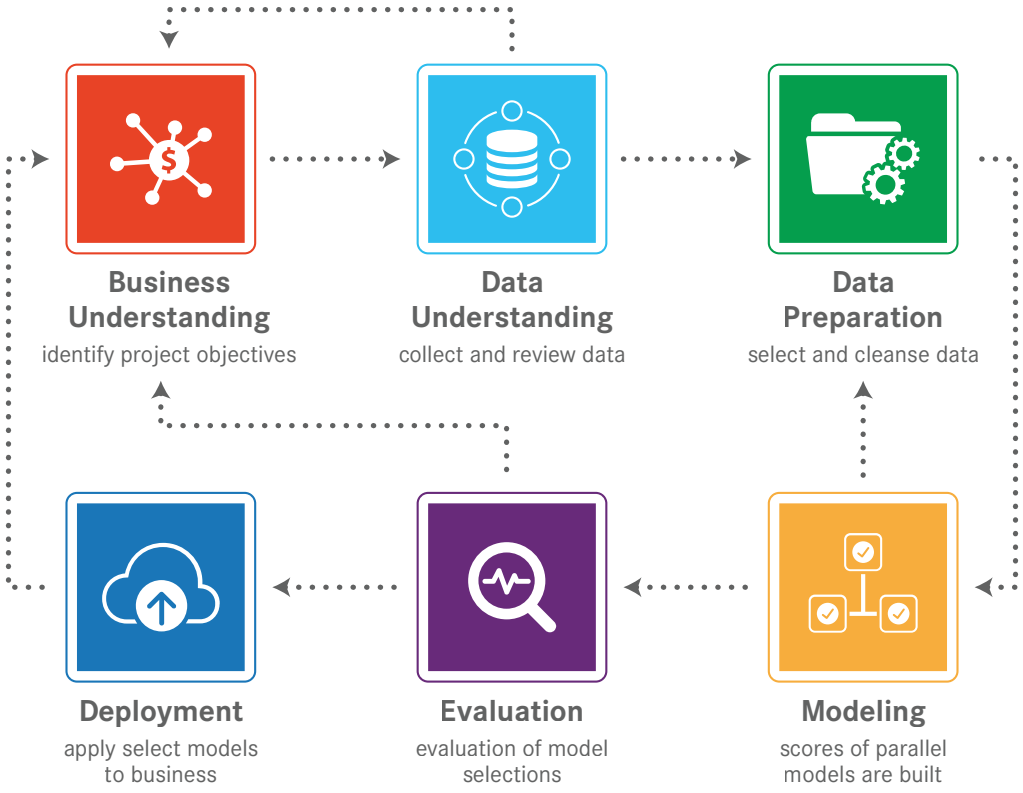

Figure: The phases of the CRISP-DM reference model

The implementation of the solution for this project which was a completely new challenge for dAlchemy, took around 2 months. Thus, machine-learning techniques were used to automatically detect anomalies in the electricity consumption data by deriving intelligence from the IoT data. These results were obtained by running data models to identify and gauge 22 parameters across 500+ databases recording readings at less than 5 second intervals.

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