According to the design specifications, it seems that our boss has taken a complete leave of her senses. In order to address her ever growing needs, the vending machine had to be redesigned in order to accommodate a variety of interfacing hardware on the market. A hardware programmable interface was needed to allow manufactures of vending machine hardware such as LCD screens and payment interface units to subscribe to the hardware signals and data lines of the vending machine and command the internal components of vending machine. The three main hardware points that needed such extensibility were Payment, Communication, and Products.

In order to address these needs a set of hardware and software rules called MADDOX (Multiple ADD On eXtensibility) protocol was created and consisted of three interfaces. The *payment* interface was responsible for managing the funds coming in from various sources of payment such as credit, debit, or physical coin as well as the ability for the payment authorization machine to dispense the change if required. The payment authorization machine such as a MasterCard PayPass unit could also retrieve relevant information from the payment façade to get information such as the current credit available, how many coins were left in their respective racks, and tell the vending machine to store coins upon a successful transaction. It also gave technicians the ability to load coins into the racks and unload coins via physical means. There are internal variables that would depend on user's actions so this interface would listen to two events – a physical coin has been accepted by the CoinSlot to update its local financials, and a selection button has been pressed to retrieve the cost of the product. This façade throws any local errors to the business logic where they are passed to the communication façade for further handling.

The *communication* interface provided many data points for a potential LCD screen or a simple LED light interface system. The idea was to turn the internal workings and actions of the vending machine into natural language responses which could then be displayed on the screen or converted to on off light in the form of LED lights. This interface would return useful information such as – the amount of funds inserted by user so far, which selection button was pressed, the name and cost of the product that was selected, a physical signal line that signals whether the machine is out of order or not, a physical signal line that activates when any of the other hardware or facades threw an error via the business logic, and an error message to display a human readable message for the error. This interface would listen to three events – the actions of the out of order light to indicate to the business logic if the machine is operable or not, all the selection buttons to retrieve relevant information about the product selected by the user, and coins accepted by CoinSlot to indicate how much money has been inserted by the user.

The *product* interface was responsible for the management of the products in the vending machine. The idea was to allow easy loading, unloading, dispensing, and configuration of the products inside each product rack in the machine. It would allow the technicians to load and unload any product into the machine's racks as well as configure each rack with a product, rename the product, and change their prices. These data lines would only be programmed to work only with the technicians' multitool. Other hardware would use this interface to dispense a product from a specific rack, or it would auto ready itself to dispense a product corresponding to the user's selection which is why it subscribes to the all the selection buttons data events.

All the hardware interfaces had custom error messages that are passed to the communication interface via the business logic as they are fired so that a potential LCD screen can display these errors. With the MADDOX protocol the vending machine was given the ability to take on a variety of hardware that could receive data on the internals of the vending machine hardware as well as safely command its internal mechanisms by providing a straightforward user experience, without compromising the efficiency, customizability, and integrity of the vending machine itself.