Design Methodology

Introduction

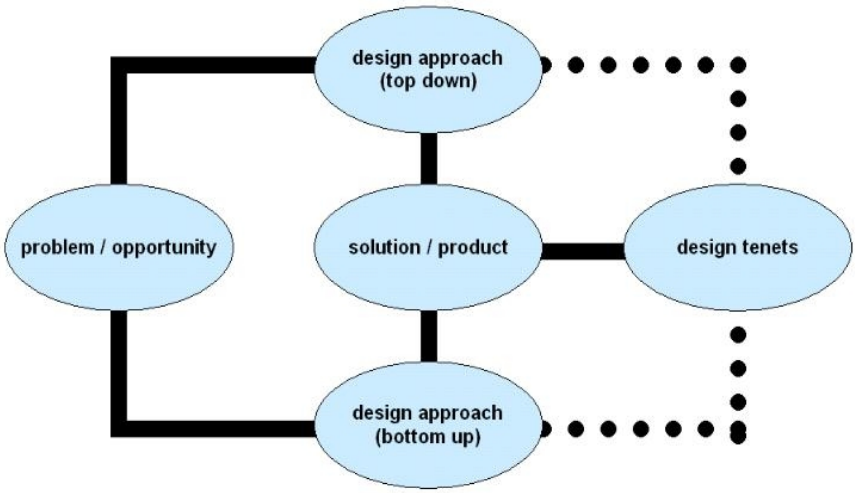
There have been numerous requests from our customers and peers to answer to them in how Atomicat develops its products. This brief provides an overview of the concepts as we apply them and is intended for a more technical reader.

This brief will also give the reader an insight in what products and characteristics to expect from Atomicat in the future.

Design 101

When designing a new product, regardless of the nature thereof, there are two things going on.

The first is the design approach itself and the second is the ideas that influence that proposal (the design tenets).



A Design Science Approach

Synergetics is an holistic approach to design pioneered by Buckminster Fuller and rooted in the topography of geometry. It is intended to be a multi-level approach in which both the whole and the parts are considered by both experience and science. It also encourages the borrowing of conceptual models and ideas between disciplines in favour of extremely complex or inaccessible ideas.

Some famous bodies for adopting this kind of thinking are both the Ferrari and recently BMW Williams Formula One Racing teams. This motor sport class is ultra competitive, high-levels of ability and skills on the parts of drivers need to be backed up by creative engineering approaches with extreme requirements on performance AND reliability.

Atomicat has adapted/adopted (depending on your point of view) this approach and produced it’s own unique approach to making new products.

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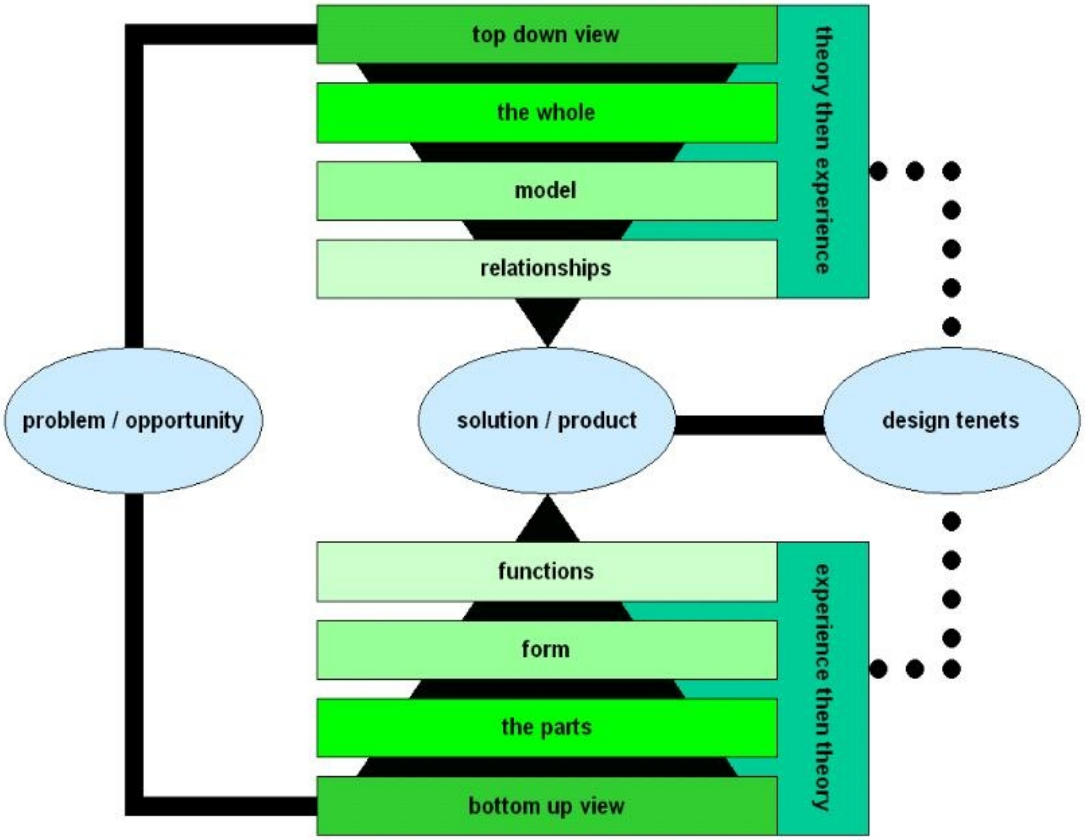
Two Sides To A Coin

Atomicat designs products both from the top down AND the bottom up. From the top down our views are influenced by theory and experience with the bias awarded to theory. From the bottom up our views have the same influences but is biased in favour of experience. Both the approaches are concurrent.

The following illustration shows the concurrent approach path to a product or solution.



Models used in other fields (Sciences or the Humanities) and Forms (found in Nature and Experience) are both relevant to how we design our product.

We will very briefly touch on the main concurrent items described in the previous illustration in their order of execution.

The Whole And The Parts

The whole refers to the brief outline of the solution or product. The parts refer to actual skills, components and resources available. The first can be an idea statement or a directive, the second a programming language.

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The Model And The Form

The model is a picture or topographic representation of the solution or product. It must answer how the solution or product works. The parts drive the form, i.e. physics provides conventions on structural engineering. Both require skills, models require insight into problems and forms require insights into the range and limitations of parts.

The Relationships And The Functions

The relationships inside the model have to be plotted and understood. The functions are the specific touchstones where the form touches the model in reality. Care must also be taken to look for unexpected or hidden relationships. The relationships and the functions drive the details of the plan or program of work.

URS's and Techspecs

The user requirement specification and technical specification conform to the model, but it also includes a business case and a technical case. Understand it like this;

- The problem or need is the **user requirement specification**
- The top down design approach is the **business case**
- The bottom up design approach is the **technical case**
- The resulting program of work is the **technical specification**

The Design Tenets

The way the product outcomes are achieved are driven by a collection of design tenets. These are principles we apply when we consider, design, make and package a product for the catalogue. Think of them as natural forces that shape the final outcome of the design approach.

The tenets have no distinct order or ranking of importance, they are all always relevant and important.

In many cases the tenets are juxtaposed or even overlap, this is why is best to view them as types of forces which work on the product design approach to help shape the final outcome.

The following illustration shows the individual tenets;

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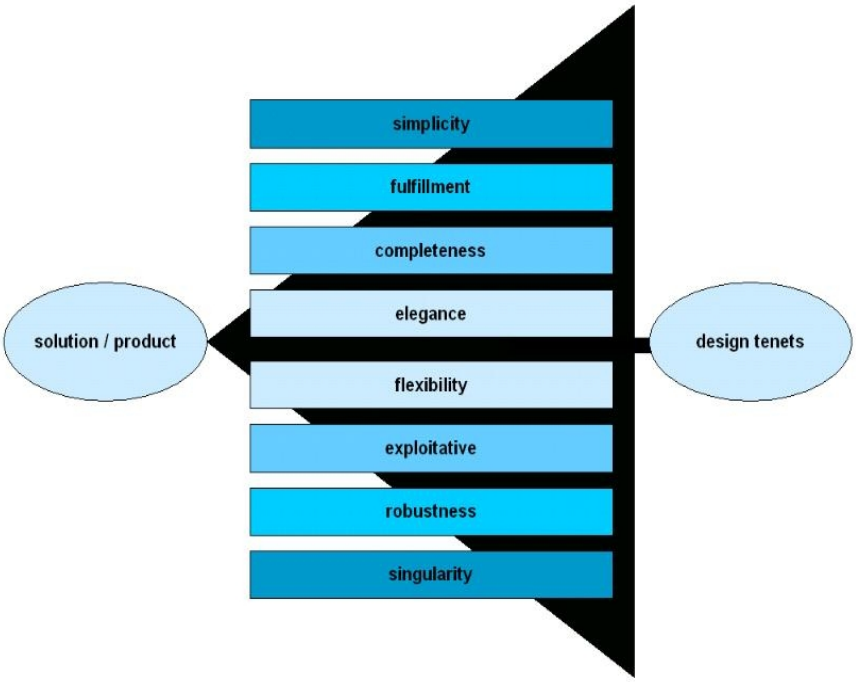

Simplicity

"In anything at all, perfection is finally attained not when there is no longer anything to add but when there is no longer anything to take away, when a body has been stripped to its nakedness"

- *Antoine De Saint-Exupery*

The above quote applies. We always design with an eye towards simplicity. Our designs attempt to strip products and solutions down to their most basic form, making them easy to learn, easy to use and easy to understand.

Fulfilment

Does the solution or product properly solve a problem or need? This means we leave no logical loose ends or slap on a bolt or patch at the end of the development to achieve a right fit to the original problem the product was supposedly designed for.

Completeness

"Everything must come into your scheme, otherwise you cannot achieve real simplicity"

- *Gertrude Stein*

Complimentary to simplicity, it drives the scope of our thinking to push our designs, research, scenarios and thinking to more elaborate scenarios in order to achieve holistic fulfilment. A complete product leaves no begging questions.

Elegance

The hallmark of a really good design is that it accomplishes what it sets out to do in an elegant way. To achieve elegance one must test for ergonomics, usage patterns and so on. A really complex product only becomes usable if simple but successful if elegant too.

Flexibility

The questions relate to if the need or problem were different, how applicable the design would be. Can the design be used in unexpected ways? Does the design cater for scale and different types of environments? Do we fit in or do we have to be fitted to?

Exploitative

This relates to both the environment and the economics of a problem or need a design is trying to address. It asks,

- What is available to us to re-use or use in an new and innovative way?
- Is there something like out there we can learn from?
- What factors in the problem can be turned towards the solution?
- What portion of the need can become a have?
- Are there cost effective alternatives?
- What is the most economical approach to the need or problem?

Robustness

This is about testing. If all the tenets are applied, how robust is the solution? Do the features work? What stresses it and what causes it to fail? Does it comply to the other tenets? The intention of this tenet is to provide tough, tired and tested products, even if the departure and technology is radical.

Singularity

Is the product unique and does it show where its from?

The market is large, quick and competitive. Not only do we have to be usable, reliable, complete and accessible, we also have to be differentiated in our offering.

Singularity could be seen as an element of the Atomicat culture and identity, such as the convention of our discarding documentation clutter in favour of an owner's manual, but it also applies to competitors. What do we have that blows them out of the water? Does the product conform with other Atomicat products strategically and technologically?

Bringing It Together

The following illustration show how it all comes together;

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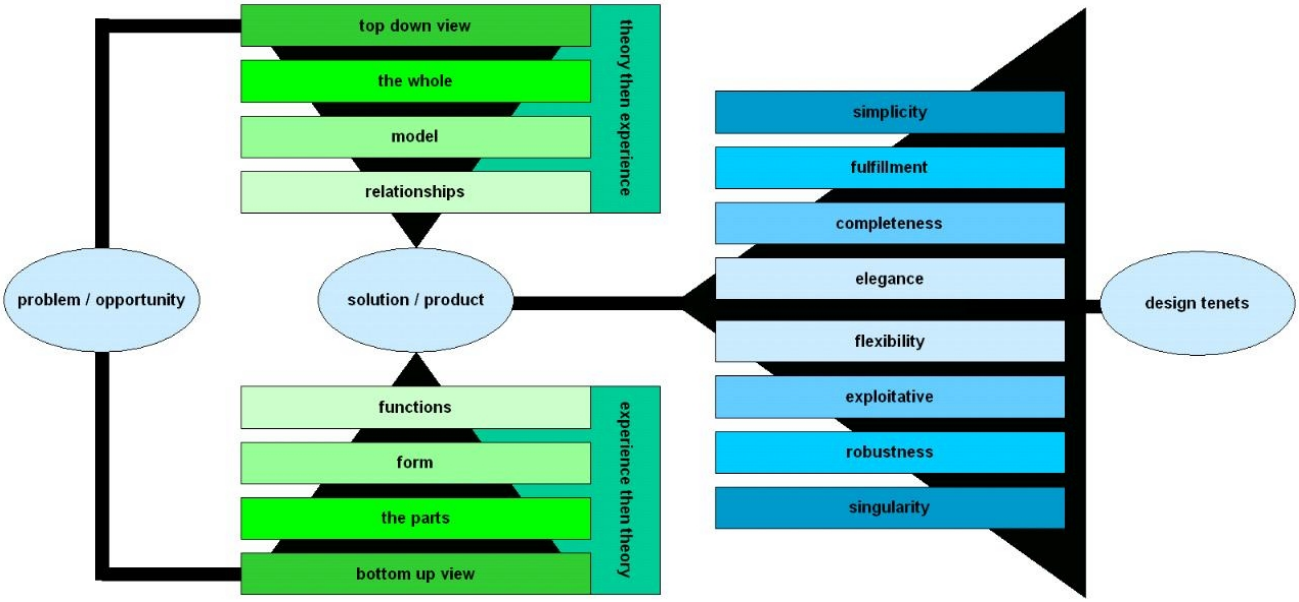

Coding The Code, Riveting The Rivets

Once the design is complete we move it to manufacturing. Atomicat has selected methodologies that provide us with quick iterations, collaboration, constant design improvement and feedback loops.

The development methodology is called the X-Treme methodology for software development and it is covered in detail in an accompanying brief.

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