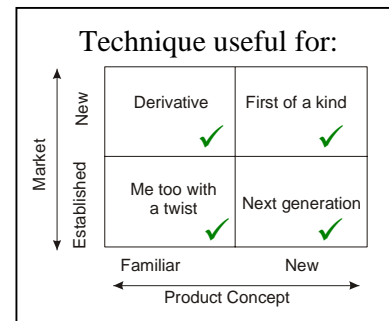


## Requirements and Constraints matrix

**In a few words:** *The more conflicts between requirements and constraints you can identify, the more the product will design itself.*

Most product development is a series of compromises between the various stakeholder agendas for the product. These stakeholders usually include, at the very least, customers, company management and external regulatory bodies. Company management has a vision for the product that is being developed, while customers may have a slightly differing vision of the product that they will eventually be asked to purchase. Of course regulatory bodies also usually have their say in matters, as the product must conform to certain safety standards or other.



- Requirements are features that the product must have in order to be accepted by the target market.
- Extras are features that would be of additional benefit to the user, but are not necessarily required. They can usually be safely incorporated with requirements but will have a lesser level of importance.
- Constraints are things that the products must include, conform to or be designed around. It should be noted that constraints are not necessarily negative; they are just things (usually components or systems) that the product must conform to.

A simple way of looking at the difference between requirements and constraints is to look at them as being essentially the same types of entities, but with requirements usually coming from the customer side, while constraints generally come from the company management side and from external regulatory bodies.

A useful technique to use when developing the brief for a product to be developed is to list all the requirements and constraints involved in the product. Just the act of creating the list can be of enormous benefits, as the more constraints and requirements we can identify, the easier those parts of the product will be to design.

If for example, company management has given a constraint of using an on-board 12mm thick battery in the product, then there is little point in wasting much time in designing a product that is 5mm thick. That is not to say that the decision to use the 12mm battery is right or wrong. It is simply a decision that may have been made by company management for reasons that they may not have made the design team aware of. If the design team believes that this constraint will

Hand-held computer	
Requirements	Constraints
As thin as possible	Must cost less than \$100 to produce
Light-weight	Designed for assembly
Must fit in shirt breast pocket	Must use existing battery, 12mm thick
Waterproof	Must use existing assembly line
Well lit display	
Solid gold cover	

impede the design to too great an extent, they can of course present their case arguments to the stakeholders in an attempt to remove this constraint.

## The Matrix

The easiest way to remove or modify constraints such as the one described above is to present an argument as to how they conflict with possible requirements that the product must have. An easy way to identify these conflicts is to arrange the constraints and requirements into a matrix.

This matrix then graphically shows which requirements conflict with which constraints and indicate the level to which they conflict. By adding up the scores for each row and column, a reconsideration level can also be established. In our example, the use of the existing battery has a stakeholder reconsideration level of 15, which tells management that of all the constraints, this is the one that they most strongly need to reconsider. In reconsidering it, they must make either of two decisions: to remove the constraint, or to modify the customer requirements with which it conflicts the most deeply. The same goes with the customer reconsideration levels, where we need to question the customer and conduct some market research about what they mean by “as thin as possible”, and to question how attached they really are to their solid gold front cover.

Handheld Computer							
	Must cost less than \$100	Designed for assembly	Must use existing battery (12mm thick)	Must use existing assembly line	Supplied with P3 chip but must allow for p4	Customer reconsideration level	
As thin as possible		△	●		○	14	
Light-weight			○			4	
Must fit in shirt pocket			△		△	2	
Water-proof	△	○		○		9	
Well lit display	△		○			5	
Solid gold front cover	●					9	
Stakeholder Reconsideration level	11	5	15	4	5		

## References

Sullivan, L.P., 1986, "Quality Function Deployment", Quality Progress, June, pp 39-50.

### Recommended Further Reading

Clausing, D. and S. Pugh (1991). "Enhanced Quality Function Deployment", Design and Productivity International Conference, Honolulu HI, 6-8 Feb.