

PRODUCT

DESIGN & DEVELOPMENT

The Brainstorm: Innovation In Consumer Electronics

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Have massive user groups and commerce spurred or spurned innovation in the consumer electronics market?



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There is no doubt that the rate of product development has increased dramatically due to nearly instantaneous direct user feedback to the supplier – specifically the design team. It has also allowed standards and common platforms to emerge based upon open and broad base communication between end users and all suppliers.

Of course the open communication has also allowed easier entry to market of competitors who were behind in the development cycle. All this spawns an incredible level of development and focus on end-consumer needs and desires.

The less obvious impact is on suppliers to the end system manufacturers. AVX commonly interacts with user groups and design blogs to find needs and problems on a first hand basis.

Signal integrity is a huge concern to designers. Several user groups concentrate on finding solutions to their problems. It was through a user group that AVX realized that a switch mode power capacitor could achieve a higher level of performance if the PCB routing were slightly modified.

We proposed that the lead frame of a switch mode power supply could be connected to the circuit in a way that it acts as the bus bar for Vcc and ground.

For example, if the Vcc trace to a SMO capacitor ran to one corner of the long metal frame termination and then stops, it forces the current flow up into the SMOs lead frame. The far end of that same termination would be connected to a similar pad, which then carries the current flow back onto the PCB.

By doing this, the parallel inductance of the SMO capacitor decreases since it appears to be placed closer to the PCB power traces. Since the SMO capacitor lead frame acts as a bus bar, its inductance is placed in series with the current flow, helping the noise figures of the power supply circuit.

AVX developed a series of Surface Mount Transient Voltage Suppressors (TVSs) in response to end users complaining that cutting edge systems were easily damaged by voltage transients and RFI encountered in everyday use conditions.

We also created a family of ultra miniature TVS devices that act as broadband EMI filters in the off state and Bi-directional Transient Voltage Suppressors in the on state.

Additionally, we optimized the level of energy the TVS to exactly match the level of threats reported by end users.



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I see a lot of innovation coming from the burgeoning do-it-yourself (DIY) community, including places like [MAKE](#) and [Hack-a-Day](#), which could be thought of as 'massive user groups' who take off-the-shelf consumer electronic products and repurpose them to suit their needs. Many of these lead users are very vocal and will speak out about problems in products or new features they'd like to see.

The recent poor economy has strengthened the DIY ethos and seems to have led to a shift in commerce. Many consumers seem to be eschewing the latest and greatest innovative products in favor of a lesser model than can be used to just 'get by' or be modified to perform the desired task.

There are also many product development companies now releasing open-source consumer electronic designs, such as Chumby and Bug Labs, to cater to the DIY community by sharing the internals of their product and in hopes of their product being modified by diehard users who require specific features. Those 'hacks' or additions could then be rolled back into the original products as legitimate features.

Innovation is no longer coming only from behind the closed doors of brick-and-mortar product design firms. It's also coming from the users and hackers of products.



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From our vantage point in the product development food chain — transitioning products from engineering to manufacturing — we see more spurring of innovation than spurning. Most user groups have embraced innovation in the consumer electronics market.

Who doesn't enjoy MP3 players, high definition and large screen TVs, and the ever-increasing functionality found in cell phones? We've seen a recent increase in the use of Bluetooth and other wireless technologies to facilitate and enable applications that were once impossible. Similarly, miniature LCD and touch screen displays are now common in most user interfaces.

While consumer entertainment electronics are rapidly developing, we also see innovation from the consumer electronics industry flowing into and enhancing products in other markets, such as alternative energy and medical appliances.

For instance, we are now working with a young company to develop a patient monitoring device that will enable the acquisition and transmittal of patient data from the home to the doctor's office. This device uses Bluetooth and IR data transmission (both outgrowths of consumer electronics) to transmit information to the home-based host unit which is tied via internet to a central office monitoring system.

From this perspective, we believe the proliferation of useful knowledge and technologies from user groups and commerce both facilitates and stimulates pioneering products not only in the consumer electronics industry, but across several other developing markets as well.



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We believe the question is sufficiently involved, a simple 'yes' or 'no' will not answer it. Let's look at both sides.

It appears that Windows XP users have stalled deployment of Windows Vista. Windows Vista and the associated Microsoft Office 2007 business suite made some significant changes to the user interface, presumably in the interest of improving the user experience. We also see islands of innovation followed by 'wannabes' (See: iPod and iPhone copycats).

On the other hand, spurning of innovation does not occur when electronics make life easy. USB keys make life easier, and they have proliferated in increasing numbers and sizes as they have overrun the previous storage media. Why? They are small, robust, random access, use a common computer transfer technology and they work.

Organizations have been taking advantage of user groups for a long time — one of the most sophisticated being Apple. They have always had a strong user group for the Macintosh and they have leveraged these unpaid evangelists for over two decades.

Sometimes large groups and consensus can slow up progress, but perhaps this is more likely to occur when the enterprise involved does not make their users 'part of the legend.' In this case, we would anticipate resistance.

We suspect resistance from commerce and user groups can be overcome through the following:

- Contracts between developing organizations and user groups.
- Users and 'special' communications channels.
- Prediction of lead times and careful manipulation of "early adopters."
- A mature understanding of the marketplace ethnography.