From Passivity to Productivity

The Intelligent Pen and the Future of Tablet Computing

An N-trig White Paper

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Executive Summary

Productivity has been, and remains to this day, the primary driving force in personal computing. Novelty facilitates market penetration, but productivity is key to saturation. The future success of the tablet segment – and of personal mobile touch computing as a whole – depends largely on the ability of manufacturers to achieve the right combination of fun and productivity.

Despite this, current input paradigms – multi-touch keyboards and simple capacitive pens - relegate tablets to remain tools for content consumption, not creation. This has the potential to be a severely limiting factor in maintaining market traction in the long-term.

*The simple capacitive stylus is insufficient to turn the tablet into a precise and productive work environment. The next step in the evolution of tablet computing is the marriage of the power and portability of the tablet with the accuracy and intimacy of the handheld writing implement – **the intelligent pen.***

The intelligent pen – which boasts advanced functionality far beyond the traditional stylus such as enhanced accuracy, high resolution, fast report rate for smooth inking, hover functionality, pressure sensitivity and support for palm rejection - is the answer to this challenge. Without demanding disruptive integration, the intelligent pen offers the rich functionality that is key to moving tablet computing from the realm of novelty into viable productivity.

In a true multi-touch environment, the intelligent pen enables a more effective, natural and accurate form of input, enabling users to write and annotate directly on screen much as they would on a textbook or pad of paper. This results not only in the personal experience provided by existing tablets, but more importantly in a higher level of productivity for work, home and school.

In a competitive and crowded market space, tablet manufacturers are seeking differentiators that don't significantly impact overhead or slow time to market. A productivity market focus is such a differentiator in today's early stage tablet market. Intelligent pens like the N-trig DuoSense® Digital Pencil™ complement multi-touch functionality, bringing productivity to the tablet and offering tablet producers a solution that is easy to integrate and use, not a burden to the ecosystem, and highly scalable.

From Novelty to Productivity

Since the earliest days of personal computing, devices and products have followed a surprisingly similar evolutionary path. One of the earliest mass-adopted home computing devices, Atari Pong (released in 1972), was an entertainment-only device that owed its popularity largely to the novelty factor. For the first time, users could *interact* with their television sets – it was a radical departure from the passivity of just watching TV.

Subsequent devices followed a similar path - novelty adoption (e.g. the Commodore PET in 1977), followed by the next generation of productivity (the IBM PC in 1982, for example). *Productivity has been, and remains to this day, the primary driving force in personal computing. Novelty facilitates market penetration, but productivity is key to saturation. In other words, Pong was fun – but once computers became viable tools for work (with some fun thrown in), their mass-market appeal really took off.*

The Tablet – Toy or Tool?

The first commercial tablet (personal mobile touch-enabled) computer was introduced in 1989. The development of tablet computing has been facilitated by ever-more sophisticated touch computing hardware and software, and adoption of tablet products has shown consistent growth and even preeminence in certain segments.

That said, the seminal moment in personal mobile touch computing with mass-market appeal did not come until the introduction of the Apple iPad in 2010. Riding on the staggering success of its iPhone, Apple set with the iPad a new standard of tablet portability, usability and outright fun - essentially creating the tablet computing segment. Manufacturers worldwide are currently "riding the tablet wave" – and adoption of these slim, portable, and powerful devices is booming.

However, in keeping with the above-mentioned evolutionary path of personal computing, it is crucial to examine the question of tablet *productivity*. How much of the adoption of tablets today is due to the novelty factor? Can tablets in their current configuration be actual productivity tools? *The survival of the tablet paradigm – and the future of personal mobile touch computing as a whole – depends largely on the ability of manufacturers to achieve the right combination of fun and productivity.*

Content Consumption or Creation?

Mass-market tablet computing in its current configuration provides outstanding opportunities for *consumption* of content. However, in a digital ecosystem that's all about expression, how long will users be content with just consuming?

Most existing tablet input is capacitive touch-based - multi-touch keyboards or simple capacitive pens. It is widely agreed that, while fine for simple content creation (email and the like), current tablet input paradigms are insufficient for complex document and data manipulation – that is, *insufficient for content creation.*

This is not to say that there are no productivity options today for tablet computing - but these haven't yet reached the level that will lead to mass adoption by the lucrative business and home computing segments. *Tablets remain a tool for content consumption, not creation – and this is a severely limiting factor in their prospects for maintaining market traction in the long-term.*

Back to the Basics of Written Communication

Touch computing has brought human-machine interaction to a more personal, intimate level. With our fingers, we experience the world (real and digital) on a more emotional level. This personal, hands-on experience - after years of impersonal keyboard and mouse interaction – is a significant factor in the success of tablet computing.

That said, over the millennia, humans have evolved beyond using *just* our hands, creating specialized tools to accomplish everyday tasks. Paradoxically, while tablets represent *evolution* in human-machine interface, existing tablet computing input represents a sort of *devolution* in how we use tools. The next phase of personal computing will demand the reintroduction tools into the personal computing experience in order to increase the capacity for productivity.

Throughout history, human productivity and creativity have found their expression through handwriting. Handheld written implements – from quills to ballpoints - enable the full range of human thought to be captured with a subtlety that computing has yet to duplicate. A flourish, an underline, a heavier stroke for emphasis, or even a scribble in a margin – this is the art of communication that no keyboard can capture, *but a precision and portable touch environment* **can**.

Herein lie the beauty and potential of personal mobile computing. The power and portability of the tablet need to embrace the personal vehicle of expression that is the handheld writing implement. *The next natural step in the evolution of tablet computing is making it a precise and productive environment, and the intelligent pen is answer to this challenge.*

Traditional Capacitive Pen Input Is NOT Enough

Traditional, simple capacitive pens have a lot in common with fingers. They're both good for pointing, scrolling, clicking. They're both readily available, and – in the case of the stylus – inexpensive.

However, the intelligent active pen (like the DuoSense battery-powered Digital Pencil from N-trig) has a wealth of functionality that is key to enabling productivity and moving tablet computing from the realm of novelty into a viable productivity.

Offering enhanced accuracy, high resolution, fast report rate for smooth inking, hover functionality, pressure sensitivity and support for palm rejection - in a multi-touch environment the intelligent stylus enables a more effective, natural and accurate form of input. The pen enables users to write, draw and annotate on screen just as they would on paper. The pen utilizes this natural and accurate form of input interaction to provide an interactive and creative approach to computing. *This delivers to users not only a more intimate and accurate personal experience than that provided by existing tablets, but more importantly a level of productivity far beyond that of touch-only devices.*

The Intelligent Pen - For Business, Education, and More

The next generation of tablets will bring to market all the entertainment and content consumption functionality of today's tablets, together with real productivity options – and all without compromise on form factor, portability, or performance. This will markedly impact the way users leverage tablets at the office, in the home and at school.

For Work

In a meeting, on the go, or in the office - using an intelligent pen enables transcription of thoughts and annotation on documents – silently, inconspicuously and accurately. In situations where traditional laptops fall short – standing or sitting in close proximity on a subway, waiting in an airport security line, and similar situations – the pen-enabled tablet remains accessible and productive. Using the pen, work is simplified and speedy, enabling completion of tasks ranging from managing a to-do list to updating a spreadsheet, writing a crucial email, or highlighting a document to share with a colleague.

For School

The dual-mode tablet enables a true "anywhere, anytime" approach to study – in class or on the way to and from school. The pen is not only ideal for taking notes during a lecture, but can be used to capture explanations on a subject matter directly on an electronic handout or e-book version of the textbook being discussed. Diagrams and equations that are often challenging to express with a keyboard and a mouse are captured in a natural and easy manner.

For Home

The multi-touch and pen enabled tablet delivers a range of functionality that suits hectic lifestyles. Shopping list items can be easily ticked off on-screen while at the store. Highlighting favorite passages in an e-book is swift and simple. Even writing a to-do list or a quick note to other family members is easier - combining the convenience of a pen with the capabilities of word processing.

A Market-Changing Game

Just as the tablet market changed with the introduction of the iPad, the tablet ecosystem continues to constantly evolve. The rise of the Android operating system for mobile devices has led to a broad range of similarly-priced tablets with similar form-factor, similar performance, and similar functionality.

In this competitive and crowded market space, manufacturers are seeking differentiators. The ideal differentiator would deliver markedly enhanced value without impacting overhead or slowing time to market.

In today's early stage tablet market, one such valuable differentiator is productivity. The integration of combined multi-touch and pen input by tablet manufacturers, with the aim of raising tablet productivity without compromising on portability or functionality, is already well underway. *The N-trig DuoSense Digital Pencil represents mobile computing industry standardization and brings productivity to the tablet by integrating a precision active pen and touch in a single solution – enabling both creative work and interactive play, and extending tablet capabilities from just simple media consumption to advanced creation, editing, annotation and content sharing.*

About N-trig

N-trig DuoSense® is a single-device solution that combines pen and multi-touch functionality. The Digital Pencil™ enables users to annotate on screen much as on paper, and the multi-touch capabilities allow users to perform actions directly on screen. DuoSense advances standard touch technology, enhancing the touch experience from passive to active Hands-on® computing.

Offering a complete and highly usable solution to the ever-increasing demand for productivity on the move, the DuoSense pen and multi-touch capabilities advance the combined pen and multi touch experience from basic touch consumption to a much greater potential for simultaneous interactive and creative input.

Founded in 1999, N-trig is a global operation, with its headquarters in Kfar Saba, Israel, and offices in Austin, Texas, Taipei, Taiwan, Shanghai, China, and Tokyo, Japan.