# Following the nature of capitalism, or fighting towards the true potential of a product?
## "An assessment of the future of the PND Industry"

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**ABSTRACT, History has shown us that there are two different ways of development for a new innovation: a path leading toward replacement by a newer innovation and a path towards a stable and productive product. Another way to say this would be that either products are "destroyed by creativity", or the innovation gets to a point where there exists stability, both in demand and profits. These stable products follow the same curve as suggested by the Hype cycle Gartner. Products that get replaced follow the path towards Creative destruction, a definition already coined by Marx.**
**When researching if a company can influence the path it takes on this crossroads, it is required to find a highly technological market where both ways are still viable options. To provide substantiated evidence both phenomena have been investigated in the Personal Navigation Device (PND) Industry. This highly technological Industry is experiencing shrinking demands and declining profit margins. Some explain this decay as the beginning of the end. Others see the decline as a component of a valley expecting a rise to come after the fall. According to them, the industry is experiencing a normal aspect of a maturing product, and the industry will not dissolve because of it. To prove this, this paper has analyzed the connection between Gartner's Hype Cycle and the PND industry, to determine if the PND industry follows Gartner's path, or fails as the process of creative destruction suggests. There are a lot of similarities between the descriptive model of Gartner and the environment of the PND market, which could be used as arguments for certain choices that can be made to avoid Creative Destruction. Therefore, this Paper will investigate the assumption that a product can potentially be directed towards a stable productive future, instead of just being replaced by other, newer innovations. This paper contributes to scientific literature in the following way: this case study will research if the PND industry can serve as an example to back up the assumption that creative destruction does not have to happen, as Marx suggests. This thesis will provide a basis to check if this assumption can be generalized to other industries. This research will be a case study research.**

**Supervisor:**
**Lowik, S**
**Keywords:** Personal Navigation Device, Gartners Hype Cycle, New technologies, Early formed industries

# 1. INTRODUCTION

## 1.1 Two views on industrial perseverance.

Research in the last couple of decades has shown two different paths for a product to mature: it can either be replaced by an other product or be adapted to the changing environment. Which path a product takes is depended on the nature of the product and how organizations handle the product. The question that arises from this division is: Can the path of a product be influenced by its company?

This topic can be explained by a notion that was introduced by Clayton M. Christensen, who wrote a book called the Innovators dilemma (Christensen, 1997). In this book he addressed the end of the two paths as two different kinds of innovations: the Disruptive Innovations and Sustaining innovations. The Sustaining innovation creates a new market and a Disruptive innovation replaces an older technology.

These two concepts provide an insight in the possibilities a market provides. These concepts are ideals that explain different kinds of innovation, Christenson backs up his claims with many examples, such as the automobile industry.

These concepts presume that an innovation is one of the two types. These concepts do not leave room for the question metioned above. The hype cycle of Gartner does show the possibility of productivity(see figure 3). This thesis will try to find a way to manage a product to become a sustaining innovation.

The consequence of choosing your own path, will be that a highly technological product will not be replaced by a newly created technology, but rather be adapted and enhanced to arrive at a point of its own sustainable potential.

The internet, for example, is a product that has never been replaced; it has been adopted. This paper will investigate if a company can choose between: replacement and adaptation. So what does it take to arrive at a product's sustainable potential? There has not been a lot of research in this area, because only certain technologies can be adapted to the changing environment. Not because they are already perfect, but because their potential is fully understood.

This paper will describe two different ways of product maturity in a capitalistic environment. To make a convincing argument that a company can influence this maturity, an industry that's at a *crossroads* of these two concepts is required. To achieve a clear separation between the two paths, this paper will define the path towards failure with the Phenomenon "creative destruction" and the path to value with "the hype cycle of Gartner".

## 1.2 The two models of product maturity.

Figure 1 and 2 show the different models. In the fist model you see how a curve replaces a second curve. Whereafter the second curve will be replaced by the third curve. Theses curves describe the life of 3 products, and this process of replacement is called creative destruction.

The second model embodies the following notion:
People expect that, when a concept is made commercial, the whole world will change. After a while those people realize that the true value of the innovation is less than they expected. Gartner's hype cycle exploits this phenomenon. His company, the Gartner Group, developed a descriptive model that can be used to "asses the original excitement about potential value". (Fenn, 2008) This hype cycle describes a curve, through time, leading towards the true potential of the technology.

Figure 1: The proces of creative destruction, based on notions of Marx and Schumpeter.

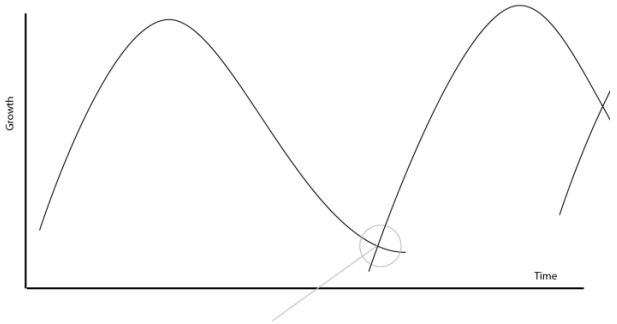



**Figure 1: A representation of Creative destruction.**

**(self-made, based on the notions of Marx)**

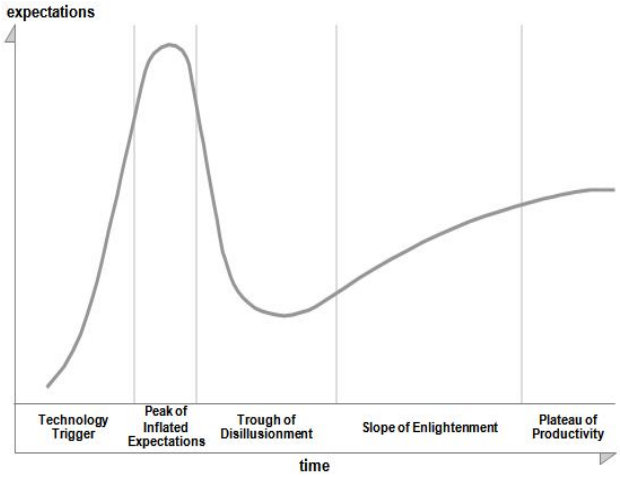
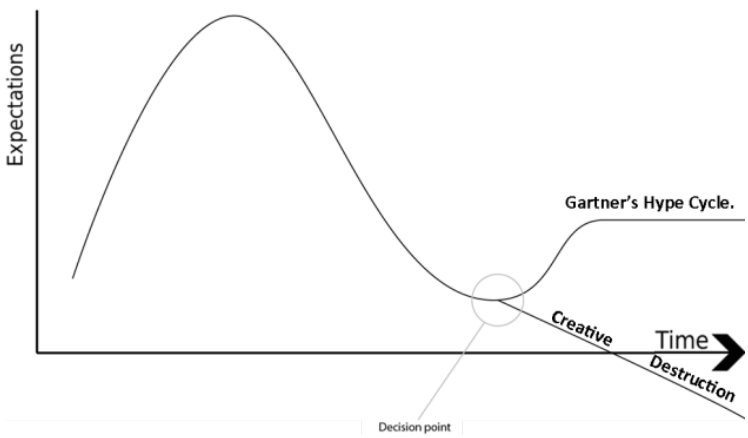



**Figure 2: Gartner's hype cycle (Fenn, 2008)**

## 1.3 The choice following the peak.

These two models show de different ways a product can mature, but when you look at them closely you see that they have a "peak " in common. Gartner's hype cycle describes the process of creative destruction before a product can reach the plateau of productivity. This model presumes there is a path towards productivity after the process of creative destruction.
This thesis will analyze the characteristics of the path that lies beyond creative destruction. Model 1 can be used to in vision the choice a company can make.
The curve going down shows creative destruction and embodies the disruptive innovations of Christenson. The curves going

**Model 1: The choice following Creative Destruction, based on Gartner's Hype Cycle.**



upwards embody the sustaining innovations and follow the hype cycle of Gartner.

## 1.4 The Search for a applicable industry

As mentioned, section 1.1, this thesis will analyze an industry to find out of the companies, operating in the industry; can achieve productivity instead of being destroyed by creativity. During the search for an applicable industry, focus was on a highly technological firm with a high growth period and a fast decline. To be certain of the highly technological criteria of the industry there has been chosen for an industry associated with the high tech sectors, as defined by Roa (2008).
On the web, on the site of Bloomberg a site with stock analysis, a pattern of high growth and fast decline was found: the Portfolios of TomTom and Garmin showed a remarkable resemblance and showed the fast rise and fast decline required. TomTom and Garmin both operate in the Personal navigation Device Industry (PND). TomTom's stock portfolio is shown below, Garmin's stock portfolio can be found in the appendix.

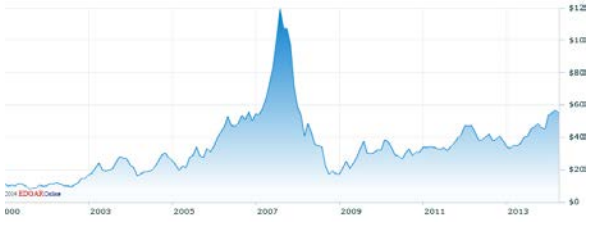


**Figure 3: TomTom Stock portfolio (Bloomberg, 2014)**

The purpose of this research will be to exploit the notion that the PND industry can be assessed using the hype cycle, and that the implications made by Gartner about the stages of the cycle should be acted upon by the players in the industry. If an organization acts on the implications of Gartner's hype cycle, they will have practically affected their own path, instead of following the way towards creative destruction. The research question will be as follows: does the hype cycle of Gartner provide managerial guidance for the PND industry to stave of being destroyed by creativity.

# 2. THE PND INDUSTRY.

## 2.1 How the PND industry came to be.

In the early stages of humanity, mankind started making maps and looking at the stars to position themselves. During this period of benevolence, humanity trusted on their instincts and they believed what they were told. China perceived itself as the middle of the earth, and so did western society..

Men started mapping the surroundings and started to develop tools by which this could be achieved. Around the year 1960 there were 3 common methods to determine locations on the earth: Radio navigation, Radar navigation and satellite navigation.

The last of these methods eventually became the method used in the PND industry. During the upcoming 40 years the method was universally used by governments, but there was no commercial aspect. The real start of the industry came in 2000 when President Clinton (Clinton, may-1-2000) made the decision to stop degrading the accuracy of the global positioning system. This decision meant that the United States government would grant full commercial access to the Global Positioning System. This meant a real kickoff for the industry: in 2001 GPS receiver technology got much smaller and cheaper and private companies began producing personal GPS products, like the in-car navigation devices from TomTom and Garmin. Garmin's Street Pilot(Garmin's new street pilot GPS, 2001)TomTom Navigator. (TomTom, Corporate TomTom).

## 2.2 The field of study.

Before addressing the theory and research, there will be a brief explanation on the importance of this field of research. This will be done by explaining the resemblance to other highly technological fields of practice, and the impact these industry have on society.

The PND industry has a lot of similar features as other industries. The PND industry is part of the "Highly technological sectors", and also include: machinery and computer equipment; electric/electronic equipment; transportation equipment (such as PND's); measuring instruments; computers and office equipment; electronics; medical instruments and drugs(Rao, 2008).

The importance of the PND industry does not only entail commonalities with other markets, but also the impact of the industry on society.

The impact this industry has on society is almost reason enough to start this research, because numbers do not lie. There are currently more than 230 million turn-by-turn navigation systems active worldwide. This includes about 80 million factory installed dashboard navigation systems, and 150 million Personal Navigation Devices (Insight, 2013). These machines are implemented in the transportation industry as well as the common live of the consumer.

Another aspect of the integration into society is the development of these devices. The devices are not developed by creating new lines of products equipped with the consumer needs, but they are driven by technological progress. They adapt new features when they can, not when they are asked to do so. So these companies are an excellent example when discussing the validity of creative destruction.

The decay in the market, shown is section 1.2, is known, but the players operating in this industry are trying to find a way towards stable demands. They have started to set-up joint ventures with Technological companies and car manufactures. Garmin Partners for example with Suzuki and Chrysler, (Garmin, 2013)because this would stabilize demand. The focus of this research will be on the PND industry because it has declined, and the players who played were not able to thrive up until this point.

TomTom for example has taken over Tele-atlas (TomTom, 2008), and MiTac bought Magellan(Fletch, 2008) and Navman(Mitac, 2007).It is still not sure however that these players, who are still standing, can survive the upcoming confrontation with the smartphone industry.

## 2.3 Upcoming threats towards the field of study.

There are threats towards the continuous survival of this industry. The two main phenomena associated with this decline are a shrinking market and not unrelated, the substitutes for the product.

First: the shrinking market is witnessed by all players in the market. Although there is little change in market share, the total market is declining. Berg Insight's findings on this topic show that in 2012 global shipments of Personal Navigation Devices declined. Units shipped dropped from 33 million to 28 million, representing a 15 percent decline in units shipped in 2012. (Insight, 2013)

This second threat, numerous substitutes, has been influenced by the media and scholars .
The differences between the uses of a PNDs versus the use of the applications on smartphones is well discussed Researchers

like Harris (Poll, 2012) found that there is a distinctive difference in using your mobile phone or your PND. He found 2 distinctive reasons in favor of the PND. First of all a smart phone is not designed for the explicit purpose of navigation, the design and the sound output are therefore not on an ideal setting for personal navigation.

This was concluded in multiple surveys, for example the survey mentioned was conducted via an online Harris Poll (Poll, 2012) aimed at United States drivers between April of 2011 and April of 2012. There were 11,925 drivers polled aged eighteen years old or older who were driving a car on a daily basis that was manufactured in 2007 or later. The result of this survey were: drivers are more likely to consider built-in navigation when buying a new car:
62% of the drivers prefer to use built-in GPS navigation. 19% of the drivers prefer a portable navigation device. 11% of drivers prefer to use smartphone based GPS navigation in their car. However, when the question was asked "would you prefer an integrated smartphone dock or an integrated PND?" results were 80% vs 20% in favor of the integrated PND devices.

Although these numbers suggest that the integrated PND will win the upcoming confrontation, it does not mean that people who already have a smartphone, will still buy PND's. PND's are still the favorite option for turn-by-turn navigation, but the substitutes are bought for other features.

The influence of the media and scholar can be described as two parties protesting two outcomes, for one issue. Part of the media expects that the products will be replaced by the smartphone, such as Leo Sun, he wrote *"Is Garmin merely postponing its inevitable demise?"* (Sun, 2013)
And the other part of the media thinks that the companies will prevail. Kuittinen for example wrote an article with about the PND industry. His title, although a little bit presumptuous, was:" *Supposeedly dead Garmin outperforms leading smartphone vendors."* (Kuittinen, 2013)
Evidence of this division in media and scholars can be found throughout the whole paper.

The PND industry came at this crossroads because the rise of numerous substitutes for their products. What contributed to the shrinking market.
But why should the companies operating in this industry fail? Why does the emergence of substitutes seem to contribute to the replacement of the original PND's?
There are two explanations for these questions.
The first explanation is, the products are going to be replaced as suggested by concept of "creative Destruction".
The second answer will be, the decline in sales, is a normal part of the development of a highly technological product. Which means that the PND's will not be replaced and the questions above will not be answered ,but discarded,.
These two different answers can be translated into the two paths mentioned in section 1.1. The first path leads to a complete failure of the market, because of the process of replacement. The second path leads to a slow rise towards productivity. These two paths form a crossroads, and the question that needs to be answered is : Are the companies in this industry able to choose which path they are going to take..

# 3. THEORETICAL BACKGROUND

As suggested , this thesis will provide an assessment of the two different paths leading from the before mentioned crossroads. Before continuing, the following statement has to be made: When a company is failing to walk the path suggested by Gartner, they will fall back on the path towards creative destruction. The purpose of this notion is to address the fact that a product will always follow creative destruction, unless it is managed properly. What proper management entails will be explained in the recommendation section.

The crossroad mentioned in this paper, will be between a path leading towards the failure of the industry; the other path will lead towards true value. There are two theoretical insights which describe these paths: The first one is called "creative Destruction" and the second paths can be presumably be associated with Gartner's hype cycle. The path called creative destruction embodies the term disruptive innovation and the Hype cycle of Gartner is a model that exploits the concept of a sustaining innovation.

## 3.1 Creative destruction

The first aspect that needs to be addressed is conceptualized by Schumpeter and Marx and discussed by Elliot: "Creative destruction". Creative destruction means that the nature of capitalism can be perceived as follows:

*"The revolutionizing process whereby the new product or method displaces the old"*. (Elliot, 1980).

He acknowledges that this process is vital to the existence of capitalism, and without it the economy, will suffer and eventually decay. Elliot, Schumpeter and Marx warned for the threats towards capitalism: Monopoly's, mass production and boundaries for gaining capital.

They described the decay as: *"….both Marx and Schumpeter (predicted) the large corporation, a product of capitalist development and technology, renders the economic and social position of the small-scale, competitive firm and its associated small bourgeoisie increasingly absolute."* (Elliot, 1980).

The decay would be realized through the centralization of capital and would lead to:

*"…. Capital accumulation and capitalist development, generates a transformation and socialization of capitalist property relations eventually "turning into communism"* (Marx, 1973). The characteristics of communism are not ideal for risk takers, and risk is a prominent aspect of creativity, growth and innovations.

These researchers. Marx and Schumpeter, sad there is a need to improve this key aspect of capitalism, "creative destruction". It would be a tool to prolong the predicted decay of capitalism. As long as both the bigger corporations and the "small bourgeoisie "are able to add to the process of "creative destruction", there will be less decay.

To accomplish this ideal focus should be shifted towards creativity and innovative ideas instead of profits.

"Creative destruction" needs to be defined because it entails a prominent aspect of business these days. The requirement to be creative and innovative helps companies to survive in growing competing industries.

The easiest way to see creative destruction would be to acknowledge the fact that all products will be replaced by substitutes. In the spirit of this thesis this would mean that the smartphone will replace the PND.

## 3.2 Theoretical aspects of the stages of the hype cycle.

This thesis will take the reader through one of these so called 'hype cycles'. This is a definition used to describe the changing stages of a technological trend. This description is based on information gathered by the Gartner Group, and can be used to

give a guiding hand when a company finds himself using a technology which could be considered a technical trend. (Fenn, 2008) There are typical events during each stage of the cycle. For example, a lot of people fail to keep up with the competition because there are media influences that need to be dealt with, scandals could be lethal. If the businesses involved would keep in mind the changes they are heading for, they should be able to implement safe guards to counter these threats. There are companies, like Gartner, who develop powerful tools to assess the reality of business, but because of the nature of these companies they are not integrated within the academic world. The nature of their business is the model and the model is the sustained competitive advantages of the Gartner Group. This makes it harder to find out how these models actually work.

The hype curve was introduced by the Gartner Group in 1995 and is a descriptive research tool, used to evaluate the progression of an emerging technology towards its position in the market. The model is based on 2 separate notions: First there are Hype driven expectations which will be followed by an innovation S curve . The hype driven expectations can be perceived as a bell curve leading upwards by enthusiasm and down by disappointment. The innovation S curve can be compared with the technology S curve. When plotted together the idea behind the Hype cycle becomes clear. The, Bell formed, Hype will supersede the , so called, take-off (figure 4).

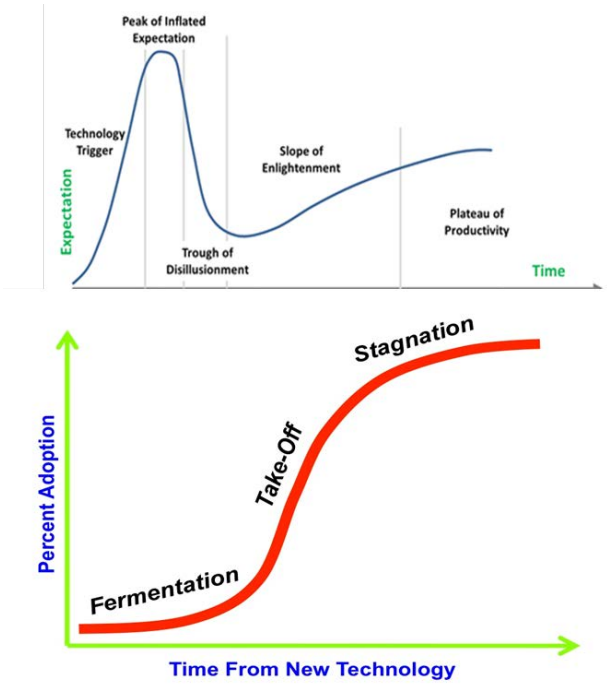



**Figure 4: The hype cycle and the technology s curve.**

Gartner's Hype cycle model, figure 3 and 4, is divided into 5 stages: First off, there will be a technology trigger, after this trigger expectations will rise and the peak of inflated expectations will commence. After this period of major profits and demand, people begin to realize that they expected more than what was provided, this stage is called: the through of disillusionment. After this period there will be a period of rising expectations called the slope of enlightenment. At the end of this period of growing expectations, there will be a stable plateau of productivity. This productivity can be achieved because all aspects of the technology are known, all features explained and customers have no more ungrounded expectations about the technology.

Every year a Hype cycle is released, this curve shows where current technological developments are in their life. Figure 5 and figure 6 show the Hype cycle curves of 2000 and 2001. The comparison of these two curves shows us that, as used in this example, Bluetooth, moved from the peak of inflated expectations phase towards the trough of disillusionment phase.

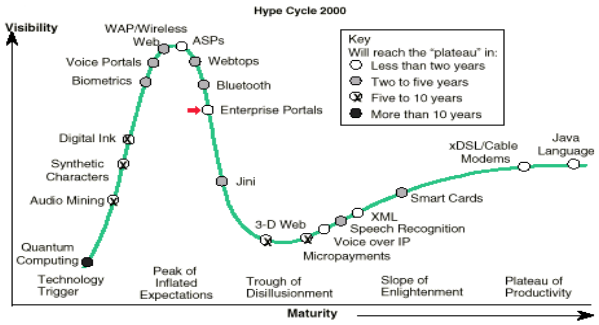



**Figure 5: Gartner's Hype Cycle 2000.**

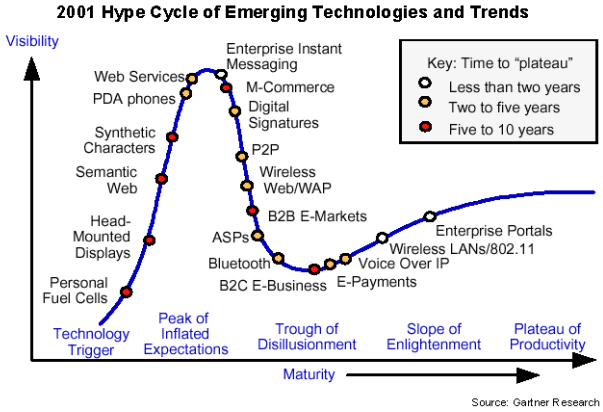



**Figure 6: Gartner's Hype cycle 2001.**

### *3.2.1 The purpose of the model.*

*"In practice, the hype curve is designed to help companies decide when they should invest in a technology".* (O'Leary, 2008)

The initial purpose of the hype cycle was to provide information about maturity. With this information companies would be able to decide when to invest in a technology, but this is not the only way the hype cycle can be used.

The model describes the historical, current and future state of the technology. Thus, when Gartner state that a technology is in a particular state, deductions can be made on what is going to happen later in the life of the technology. Fenn and Raskino proved/acknowledged this in their book: *"Can it be used to forecast the future, at least to some extent? Yes, we believe it can"* (Fenn, Mastering the hype cycle, 2008).
They provided arguments in the form of examples; including the CustomerSaleCard (data analysis on purchases at supermarket), the internet and Ryanair.
When looking at the internet, Drobik, an employee at Gartner, used the hype cycle in 2000 to assess its stage in the cycle. He not only predicted upcoming decay(the Internet Bubble) , he predicted the reemergence of internet (currently), and that it would flourish in society. (Fenn, 2008)
Gartner has shown that nearly all technologies go through stages. Following this logic, one can thus predict that a technology residing in "the peak of expectations "will collapse into a deep valley of disillusionment. The same goes for any

other stage; if there has been a trigger, it can be assumed that within a certain amount of time, a technology will arrive at a level of productivity.

This paper will try to match the industry with the hype cycle to provide substantiated evidence that the model can be used to describe a future state.

This notion is also brought forward by O'Leary, he concluded in his research that the hype cycle provides 3 strategies. Strategy 1 and 3 focused on only 1 technology, and the second strategy is "Choose a research methodology and stay with it by analyzing different technologies at similar stages in the hype cycle. (O'Leary, 2008)" Following this strategy, you can learn a lot about the technology's without using multiple research methods. The downside of this perspective is that it is better applicable to the trigger phase then the rest of the curve.

O'leary acknowledges that studying technologies that are in the same stage as your products, can provide decision making information. This would implicate that decisions can be based on the assessment of all technologies used in a product.

### *3.2.2 The 2 axes of the model .*

First, the axes of the model have to be explained.

#### *3.2.2.1 The y-axis: Expectations.*

There are certain aspects that needs to be clarified before proceeding, particularly whose expectations and what expectations,

Gartner's hype cycle is used primarily by the employees of the Gartner Group but there are researchers that describe and explain the concepts used, such as Fenn, Raskino and van Lente (Fenn J. , 2010) (Fenn, Escaping the Hype Cycle: Dead or Alive?, 2002) (Lente, 2013) (Fenn, 2008). The information in these articles and reports showed that a certain phenomenon had occurred. Gartner's early works describes the y-axis as "expectations", other researchers refer to it as "visibility", and there were even Cycles with the label "Media attention". Because all their research is derived from Gartner's early works, this thesis will use its own definition: under or over estimating the 'level of expectation around an innovation.. (Fenn, Mastering the hype cycle, 2008)

In this thesis the expectations of the companies and the media involved towards sales will be compared to what actually happened. So when sales exceed expectations the curve will rise, when sales do not meet the expectations the curve will fall.

#### *3.2.2.2 The X-axis: The maturity of the technology.*

To clarify this axis three types of cycle will be addressed, these three types of cycles (Fenn, 2010) are:

- Fast track technology: The technologies go through the cycle within 2 of 4 years.
- Normal technology: Almost no signs of path blocks and will reach its maternity within 2 or 4 years.
- Long fuse Technology: the technologies spend a longer time in the trough of disillusionment resulting in a slower developing cycle. These technologies can take 20 years to reach the Plateau of productivity.

### *3.2.3 The Different stages of the model*

In this section the different features of the difference stages, will be addressed. This is necessary before the matching principle can be applied.

#### *3.2.3.1 The technology trigger:*

*A potential technology breakthrough kicks things off. Early proof-of-concept stories and media interest trigger significant publicity. Often no usable products exist and commercial viability is unproven."* (Fenn, 2008)
As Gartner's definition suggests there are several ways a trigger manifests itself: on one hand it could be a technological breakthrough, but on the other hand it could be because of massive media interest for an existing technology. Typical for this stage is that there no prototypes available yet and focus lies on the search for funding and the development of prototypes. This definition of the trigger is a little bit short, but comparable to the model of Gartner where this stage is also short and has the following characteristics:

- R&D Focus
- Laboratory Prototypes
- Startupcompanies
- Media influences begin
- No working products yet

#### *3.2.3.2 The peak of inflated expectation.*

The rise towards inflated expectations is the first aspect of the peak of inflated expectations. It entails various forms of media covering the trigger. For example the media creates awareness in their audience about the new technology and discussions start about the impact on business and society. In this stage the highly expensive, hard to use, first- generation products emerge. The time has come to recover the Investment costs made during the technological trigger and therefore prices will rise.

The second aspect of the Peak is called "at the peak". This stage is characterized by a growing supply side on the market. Startup companies and small vendors start increasing in scale, and unrelated businesses try to find a way to adopt the technology to their own industry. Although other businesses will research the rising technology, they will not yet act on the technology in this stage. Characteristics:

- First generation products
- High price
- Loss of customization needed (general products *Customer Interaction Hub*)
- The beginning of negative press surrounding the product
- Lot of failures

#### *3.2.3.3 Trough of Disillusionment.*

*"As time passes, impatience for results begins to replace the original excitement about potential value"* (Fenn, 2008)

This stage embodies the notions that the assumptions made by the media and the companies about the abilities of the technology are not completely true. This is because of highly publicized failures and early contact with customers. During this period the demand for the products will have dropped and companies should find a way to deal with feedback received during this period. Early adopters will use this stage to start dealing with problems and issues. A. Linden and J. Fenn (Fenn, 2008) hype suggest that this stage coincides with what is called the chasm in Geoffrey Moore's book "Crossing the chasm". In his book G Moore suggests a couple of strategic choices that have to be made to cross the chasm.(Moore, 2002)

Characteristic choices of this stage:

- Target market/ Positioning the product
- Understanding the entire Product
- Marketing strategies
- Distribution channels
- Pricing

- Experimenting
- Investigating if needed for competitive
- Press usually abandons the topic

#### *3.2.3.4 Sliding into the trough Slope of Enlightenment.*

*"Some early adopters overcome the initial hurdles, begin to experience benefits, see the light at the end of the tunnel"* (Fenn, 2008)

After sliding down into the valley we reach the 4th stage of the hype cycle: the slope of enlightenment. In this stage the main theme is to understand all the benefits and theoretical practical applications of the technology. There is a need to diversify attention towards the most promising application and to design Second and third Generation products. Characteristics of this stage are:

- Understanding benefits and practical application
- Diversification in the application of the product
- Second generation /Third generation.
- Conservative Companies stay cautious

#### *3.2.3.5 Reaching the Plateau of Productivity.*

*"A sharp uptick in adoption begins, and penetration accelerates rapidly as a result of productive and useful value."* (Fenn, 2008)

At the end maturity of the technology lays the plateau of productivity. This will usually be resulting in the adoption of the technology in Main stream products. This mostly means "included in minimum standards for other products". There will be a stable and transparent market. During the Plateau of productivity the technology will focus on a particularity market segment, and is there for not as profitable as at the peak. This stage can be maintained for a long period of time.

The height of the curve is depended on the scope of the technology, this means how much it is used and how big those customer segments are. Gartner makes a distinction between two heights (Fenn, 2008): The representation of these hype cycles is shown below (figure 7).

*Lowlander Hype cycle ,t*hese Technologies are well established by the plateau, the indirect consequences are not as well explored.

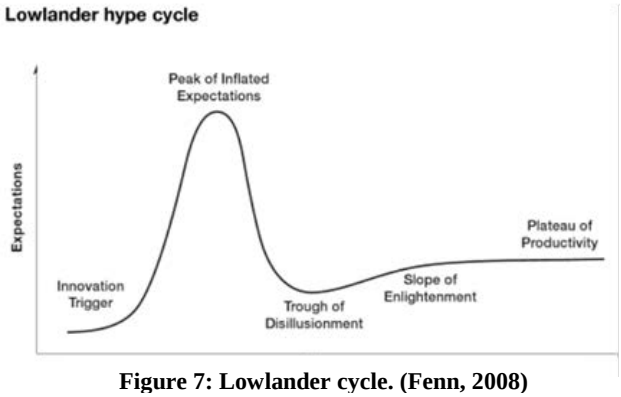



**Figure 7: Lowlander cycle. (Fenn, 2008)**

*High-Flier Hype cycle,* these innovations end up with a plateau that levels off at a higher altitude then the peak.

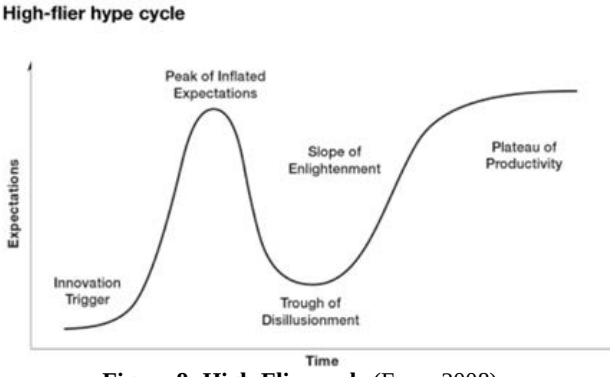



**Figure 8: High-Flier cycle** (Fenn, 2008)

High fliers are major technological advantages. For example the steam engine, cars in the industrial revolution and weapons in times of war. Keep in mind, technology, used by a company, follows the High-Flier-Hype-Cycle by staying involved and documenting everything. Opportunities, failures and successes need to be understood and exploited.

Characteristics of this stage are:

- Mainstream (incorporated into other products USB in PC)
- Criteria for assessing providers are transparent.
- Broath market applicability is important.
- The height is dependent of the niche of the market(s).

## 3.3 Troubled situations in the hype cycle.

### *3.3.1 Getting stalled along the hype cycle.*

It takes some technologies longer to walk through the stages then others. Fenn found evidence that a technology can be delayed under certain conditions. Fenn described six different situations which could indicate a longer time to maturity of a technology. The next section will describe the situations found by Fenn.

Embedded technologies*;*

*"That is, they cease to exist as a technology category or concept; instead, the functionality is embedded in other product"* (Fenn, 2002)

Embedded technologies have ceased to exist. The technology needs to accept the fact that the functionality of their product can only be applicable when embedded with other products. If the company fails to see this, they will be replaced when similar features are present in other products. Embedded technologies embody the failure to make partnerships and contracts.

When looking at the almost fully disappeared Bluetooth for example, in the beginning this technology was sold in a "plug and play form" but is now incorporated in every computer and smartphone.

Niche Technologies*;*

*"The target audience for the technology may change from what was originally intended"* (Fenn, 2002)

Technologies that are struggling to reach their full potential. The main commonalities will be a too small focus outwards. They need to broathen their scope, not only towards meeting different customers, but also toward different applications of the technology.

Phoenix Technologies;

*"Continually cycle through enthusiasm and disillusionment"* (Fenn, 2002)

"Technologies cycle through enthusiasm and disillusionment continually, with an evolved interpretation of the concept on each iterations". In other words, Agent technology as it is called, is embedded in certain product classes, and re-emerges throughout the life on a Technology. For example, the over estimation of every single aspect of the technologies leads to delays and will be waist of available funds. Artificial intelligence is such a technology, where every advancement made in this field is followed by the realization of disillusionment. The advances made in this field are time after time exaggerated. The Turing test (Saygin, 2000), to determine if artificial intelligence has been achieved, has not yet been passed. Although many researchers/companies claimed they did. For example, I.B.M.'s machine called "Watson" came close to passing, but eventually did not. (Maclver, 2010)

To avoid becoming stalled by phoenix technology a company has to avoid adopting new technologies that could potentially be phoenix technologies. An assessment of every new technology should provide enough information to determine if a technology has Phoenix characteristics.

Sleeper Technologies (Fenn, 2002)

This problem occurs trough disillusionment and can take several years to overcome. This problem is associated with long lasting engineering problems that cannot be solved, yet.

Voice recognition software for example, that is unable to deal with Speech Impediments.

Ghost Technologies;

*"placed "on hold" because they have failed to deliver on their promises"* (Fenn, 2002)

Early adaptation of the technologies have let them scarred, this means that the people associate a certain product with failure because it wasn't a huge success. For example the Nuclear Explosion in Tsjernobyl was a source of energy derived from a technology trigger: the ability to split atoms, but because of the destruction associated with this technology, researchers are not jumping to the idea of continuing to develop applicable uses for this technology. They failed to deliver their promise made regarding the safety of the technology.

Extinct technologies;

*"This premature obsolescence typically results from the emergence of a competing technology*" (Fenn, 2002)

The last problem cannot be solved, because these technologies are part of Creative Destruction as mentioned in the First part of this thesis. It occurs when a technology is completely replaced by a new product with exactly the same functions. This means that it was were stuck in one of the problems mentioned in 3.4.1 t/m 3.4.6, for too long and that they lost their chance on productive maternity. They have failed to walk the path suggested by the hype cycle of Gartner. As a result of their failure they will be replaced by the process of creative destruction.

### *3.3.2 Problems along the hype cycle*

Besides these situations, there are certain operating problems to be found when a technology is progressing along the hype cycle. The earlier mentioned stalls, are situations that can break the progress along the hype cycle. The following problems do not break the hype, but delay the stage of disillusionment. Gartner's book describes the prolonged through of disillusionment as a "time-to-value-gap". This gap will cause problems, when the product is not managed properly.

*Performance problems;*

Problems surrounding inconsistencies in the levels of accuracy, reliability, and other performance metrics.

*Integration problems:*

Problems entailing a lacking understanding of how to incorporate the innovation into an existing environment.

*Penetration problems:*

Problems associated with the acceptance and assimilation of individual users into their everyday work.

*Payback problems:*

Problems associated with projected business value because cost savings or other financial benefits aren't materializing as expected.

## 4. RESEARCH METHODOLOGY

*The research question: Can a company choose to follow the path suggested by Gartner, or is it doomed to follow the path towards creative destruction?*

First off all, the research question, formulated in the introduction needs to be reformed into a hypothesis.

*The decay in the "portable navigation industry"" is part of a valley, and can be acted op on as suggested by the model of Gartner, and the decay is ,in extension, no phenomenon for the failure of the industry, as suggested by creative destruction.*

To analyze the hypothesis the research part of the thesis is divided into two sections:
1 Is the Hype Cycle applicable on the industry?
2 What does the affirmation/contradiction of the hypotheses entail?
The first aspect of the paper will be a section on matching the hype cycle with the PND industry. This matching aspect will be conducted as follows. :
An analysis of the technologies used will provide an approximate place along the curve. Where after the "matching section" begins, during which the following questions are addressed:
1)Did the PND industry have a Trigger?
2)Did the PND industry had a peak of Inflated Expectations?
3)Did the PND industry experience Disillusionment?
4)Does the PND industry occupy the Slope of Enlightenment?
During the answering of these questions, periods will be matched with the different stages of the hype cycle. This will lead to the acknowledgment of the suggested link between Gartner's model and the industry.
Appendix A,a table can be found with all evidence on the match between the cycle and the industry. This evidence is a result of an extensive literature assessment of the industry. There has been made an assessment when an article was found with the topic PND. This assessment provides an answer to following question:
Can this article be associated with one of the characteristics of the stages of the hype cycle of Gartner? When an article did not fit the hype cycle it is be discussed in the limitations section and/or the conclusion.

This assessment will be based on the assumption that the industry was formed around 2000 and that the current stage started at the beginning of 2014.

Table 1: Used Technologies in the PND industry assessed by year

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | References |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| speech recognition | - | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 4 | 4 | (TomTomnews,2007) |
| speech to text | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | (tomTOMGO, 2006) |
| Bluetooth in auto mobiles | 2 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | (Schur,2013) |
| Voice portals | 1 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | (Ditte,2011) |
| location sensing | - | - | - | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | (Bestcargpssystem, 2006) |
| location aware services | 1 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | (Nilsson, 2011) |
| location aware applications | - | - | - | - | - | - | - | 4 | 4 | 4 | 4 | 4 | 4 | 5 | (Nilsson, 2011) |
| virtual environments | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | (Wesseleius, 2009) |
| virtual assistance | - | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | 4 | 4 | (Benjamin, 2012) |
| multi touch displays | - | - | - | - | - | - | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | (Catanzariti, 2010) |
| portable navigations | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 4 | Pnd=Portable Navigaton |

| |
|---|
| stage 1: technology trigger |
| stage 2: Peak of inflated expectations |
| stage 3: dissolution |
| stage 4: slope of enlightenment |
| stage 5: plateau of productivity |

The second and last section will be dedicated to two issues: the hypothesis and the implications. The first section will entail judgment of the hypothesis. Therefore, it will either prove or contradict the stated hypothesis, based on the information provided in the first section.
The second part will describe what the affirmation/contradiction of the hypothesis means, it will provide an assessment of the problems associated with the hype cycle and gives recommendations for the PND industry.

# 5. MATCHING THE PND INDUSTRY AND THE HYPE CYCLE.

## 5.1 Analyzing Gartner's hype cycle for technologies involved in PND Industry.

The next part of this paper will determine which technologies are used in the PND industry, and attempt to determine the location of the grouped technologies along the Gartner's Curve.

There is need for an approximation of the current place the PND industry on the curve, because it provides a basis to find the periods that will match the periods in time and the stages of the hype cycle.

The necessity of this can be emphasized by the characteristics of the plateau of productivity. This plateau has been reached when all technologies are fully understood. If not all technologies used by PND industries are fully understood, the product cannot be at the last stage.

Gartner's Hype cycle is usually used to predict and describe the evolution of one particular technology; this technology is assessed by the Gartner Company itself (Fenn, 2008). Currently they are assessing 104 different technological fields. The result of their research is shown on the Gartner Hype cycle. Each technology can be placed along the cycle. In the following year, this research will be repeated to investigate how the technology improved, in order to determine what its movement was along the curve.

The hype cycles made by Gartner during the period of 2002-2013 can be found in Appendix B.

The Technologies used by the PND industry are shown below (first column) and assessed. When there was evidence of a company in this industry using a technology mentioned by Gartner ( the references in the last column) , it was analyzed.

The acquired data was assessed (see Table 1). The table shows the technologies in the first column. When the technology is given a 1 in a certain year, it means it is residing in the Trigger Phase during that year.

When analyzing the hype cycles from the past two decades, a problem appeared. The year to year basis of the research made it very hard to map the associated technologies. For example, one year voice portals where considered a rising technology, and the next year it disappeared. In the book of Gartner's company (Fenn, 2008), he explains that the nature of technology frames is in such a way that using the same name year after year would not be feasible. The technology does not only evolve, he says, but also changes over time.

To cover this problem in the analysis, the choice was made to investigate the technologies separately in order to address the stage at a given year. When this was not possible OR if the technology did not exist during the period it was marked as -. The (-) is merely a representation of a time before the beginning of the technology, or a time when Gartner started to research the technology.

All hype cycles of Gartner have been studied, (see appendix B). The different technology's researched give a picture of the development of the bundle of technology's along the hype cycle. All these technologies combined give a representation of the PND as a technology driven product, allocated on the Hype cycle curve.

The analysis suggests that all technologies of the PND industry are in the last two stages of the hype cycle. Either they are on the slope of enlightenment or on the Plateau of Productivity. This entails that the current industry can be placed between these two stages: on the slope of enlightenment.

## 5.2 Business aspects associated with the different hype stages.

Now that a position has been found, this research continuous towards the matching component. To make a reliable comparison between the industry and the hype cycle it has to be determined if all earlier stages have occurred. Focus will therefore be on the earlier stages, suggested by the Gartner, to confirm if the industry's history included all aspects.

## 5.3 The x-axis: Time

Before discussing the different stages for the PND industry the time to maturity is needs to be determined. This research shows that the PND industry can be associated with a long fuse technology and has arrived at the slope of enlightenment within 15 years so there should be a plateau of productivity around 2020.

The length of the cycle can be used to address the investment risk surrounding the technological product. Using the Priority matrix of Gartner( Appendix B) the benefits that can be associated with the PND industry need to be determined:

Transformational benefits, High benefits, moderate benefits, low benefits.

The PND industry has an enormous influence on all organizations that use Turn by turn traffic devices. Therefore it "enables new ways of doing business across all industries"(Gartner, 2012)

This is the definition of transformational benefits. Therefore the industry will need an aggressive investment profile. If the knowledge associated with the matrix is added, it should be mentioned that organizations, operating in the PND Industry , should never take unknown risks. This does not mean that the companies should be risk averse, but it means that the risks must be evaluated, understood and assessed before acting on an opportunity.

## 5.4 The trigger of the PND industry.

*The Clinton Statement (Clinton, may-1-2000):*

The trigger described by Gartner should have certain characteristics, namely media interest, early proof-of-concept and unproven commercial viability."

The trigger (USGoverment, 2013) within this industry has a striking resemblance with the trigger described by Gartner's model. This trigger occurred in the form of a Statement by the US president regarding the United States decision to stop degrading global positioning system accuracy. Clinton introduced the global position system to the commercial world. GPS was in its early stages property of the United States government, because they would not make their Satellites available to the world. The United States government saw the utility of GPS, en how the technology could result in numerous application regarding air, path, marine and even rail navigation. They thought that the increase in accuracy would allow new applications and technologies to emerge. This would enhance the way of living. The whole statement can be found in the appendix.

To lay foundations of accepting this event as a real trigger. This research assessed this event by the aspects of Gartner's technological trigger.

*R&D Focus:*

The early R&D focus can be derived from the money spend by the American government to build the Gps: 12 Billion dollars. (DSPO, 2000)Startup companies

The startup companies that took advantage of this trigger where TomTom, Garmin, Magellan, MiTech, Navigon and Lowrance. Tomtom for example stept in when Harold Goddijn joint their company in 2001, when they introduced the TomTom Navigator. (TomTom, 2013)

*Media influences begin:*

First off, this stage resembles a phase where there are high media interests. The Statement was widely covered in the media and the coverage of the statement was the first media influence on the subject of "PND".

*Early proof of concept:*

Second, the stage is fueled by early proof of concept. In this regard it refers to the acknowledgement of the US government that GPS has proven to be useful in the military. The military had 24 satellites orbiting earth in 1993, and navigation devices started to be incorporated in military vehicles, ships and airplanes. In a paper published in 1996 Jon C Dale evaluated the capabilities of GPS for military missions. (Dale, 1996)

*Not yet working products:*

The third aspect can also be found in the Trigger of the PND industry. The commercial aspects of the technology or in this case the commercial aspects of the product, were not (yet) determined. People started to develop and invest, R&D focus, in the ideas accumulated from the idea of GPS.

The last aspect of the trigger: During the trigger there are no working products that could be embraced because before the statement was made, working products were not accurate enough to be considered as personal navigation devices. These were only GPS receivers, and these products had not yet been fitted with all other technologies discussed in section 5.1.

*Laboratory prototypes:*

There was a lot of evidence of the companies involved making prototypes around the year 2000, but because it is a normal stage of developing the product it had to happen. For example the GSC 100 of Maggellan was developed for the United States army but they eventually developed the GPS2000 for the first commercial use. On this topic, some of the technologies used were developed during 1970-2000(Army technology, 2014). Only after this trigger the commercial product lines began, which means that the army applications of the global positioning system can be considered as prototypes.

## 5.5 Did the PND industry had a peak of Inflated Expectations?(2001-2009)

The Peak of inflated expectations should include: First generation products,high prices,lots of customization needed (general products) and the beginning of negative press surrounding the product begins. First off this period will be mapped by providing headlines and details about that period in time.

The Early Adopters were starting to get settled in the market, all had their own versions of the product. Tom-toms, for example, reports results that exceeded expectations (TomTom, 2004).

*Customization:*

The company's involved: TomTom Garmin, and Magellan, started to develop products only for the personal consumers. When use increased further, in 2006/2007 (In-Stat, 2008) and in the year 2007/2008 they kept beating the expected sales forecasts (Research, 2008). In 2008 the industry started to broaden towards the whole world. The worldwide shipment of PNDs was higher than anticipated in 2007. (In-Stat, 2008)

*Negative press:*

The aspect of negative press surrounding the product could also be found, because at the same time the rising expectations of scholars and the media started to get negative. For example, IMS Research was stating that there was an evolution needed (Staff, 2009). An evolution implicated the replacement of the products on the market. In-stat (IN-Stat, 2007)also recommended that the PND should be replaced by Handset navigation poised, which turned out to be a less preferable solution to personal navigation.

In 2007 N. Memarovic wrote her thesis on the influences of personal navigation devices on drivers. She looked at visual attention while driving with a PND, she found evidence that the PND's would make driving more difficult instead of less. She found out that the expected result of a device made other aspects of driving harder. This research resembles the Peak of inflated Expectations perfectly, because Memarovic determined that the expectations about the devices were exaggerated. (Memarovic, 2007)

*First generation products:*

Also, the first generation products were introduced. In 2001 TomTom introduced their first Navigator(TomTom, Corporate TomTom, 2013; magellan, 2004). Garmin introduced his product "the Streetpilot GPS" at the high price of 377.95 dollar. (Garmin, 2001) . In the beginning of this stage they were under 100 dollars. (magellan, 2004)

*Lot of failures:*

There was no evidence of failing products, but there where failing companies. The excisting companies started to buy their competitors. For example TomTom took over Tele-atlas (TomTom,2008) and Mio's parentcompany MiTAC bought Magellan (Fletch,2008) and Navman (Mitac, 2007)

## 5.6 Did the PND industry experience Disillusionment? (2009-2013)

The main component of this stage is performing under expectations. In the year 2010 Quarter 2 the first disappointing sales *numbers* came lurking around the corner. Garmin Lost a lot of sales (Savitz, 2011), and also TomTom's profits turned a corner(Steinglass, 2011).

*Target market and positioning the product:*

The next aspect of this phase is the lowering of expectations(Nusca, 2011), but even the lower expectations cannot be met. Until 2013 the demand kept dropping (Steinglass, 2013). The companies in the industry tried to focus their efforts on the safety factors involved in the use of their devices (Tomtom.com, 2012). They also started adapting the technology to other applications of their products, for example in TomTom's case: fitness. At the end of this stage the media had no attention for the Products, the stocks were falling and so did the interest of the media.

*Pricing:*

Both TomTom and Garmin slashed their prices to arm themselves against the upcoming Google threat, the substitutes for the devices.(Hesseldahl, 2009).

*Experimenting, marketing strategies and distribution channels:*

The organizations in the industry used experiments in this stage to overcome the falling demand, they started diversification (Gadgetrider, 2009). Tom Tom experimented with customer segments, and produced the TomTom whit pearl, a navigation device only for women. (Gadgetrider, 2009) an other example is TomTom and Magellan making an Android app, thereby creating a new distribution channel for their products. (TomTom, Corporate Tom Tom, 2012) (Magellan, Maggellan smartGPS Apps, 2014)

*Investigating competitors:*

This move did more than just expand TomTom's scope, it was an investment with competitive reason. The organization has already realized that the Competition (Garmin, Mio but also Apple) is fierce, and clear cut steps, such as the use of the android market, were monitored and if needed mimicked.

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## 5.7 - Does the PND industry occupy the Slope of Enlightenment?(current)

There are several aspects that need to be present before the slope of enlightenment can be reached. The main aspects of this stage are: Fully Understanding benefits and practical application of the product, Diversification in the application of the product, emerging of Second/third generation, Cautious conservative companies and last but not least stabilizing profits and growing expectations.

*Rising expectations:*

The "rising expectation"aspect is numerously mentioned the last couple of months and is also reflected in the Dutch news. The NRC is reporting growth in the profits of TomTom, as so does RTL (RTL, 2014)."

Gartner has also found himself exceeding expectation in the last quarter of 2013"(Tadena, 2013).

Gartner is even outperforming his competitor Apple, what nobody ever expected(Kuittinen, 2013).

Other signs of growth of demand can be seen when looking at the stock markets of leading companies. Bloomberg.com shows a slight but significant growth in both the stock of Garmin(bloomberg, 2014) and TomTom (Bloomberg, 2014).

*Diversification and understanding benefits:*

Gartner's Slope of enlightenment implicates that the companies understand the full concept of their product, and that they know how to benefit from the practical applications of their product. There was evidence found of the benefits the different companies accumulated from their different practical use of the PND's. First off, Magellan introduced an integrated dashcam (Magellan, 2014). They integrated a camera because they found out that the PND could add to the sense of security and safety. Besides this, the "PathMate 6230-LM", has been equipped with all kinds of unique practical applications: Traffic control, Red light indicators etc. TomTom had found that the existing products added much value to motorcycle rentals, but rental agencies did not include the devices. TomTom benefited from the opportunity and gained a contract with EagleRider.(Reuters, 2014)

The diversification can be seen in the use of PND's for fitness purposes(Griffin, 2014).

Although the earlier mentioned motorcycle applications, Safety application and fitness application are diversifications in their own right, this were not the only diversifications that were made. Garmin started to develop products for marine and aviation purposes.(Keulen, 2013)

*Second and third generation products:*

All the applications of the Bundling of PND technology are second and third generation products. So in the case of the PND industry the Gps Watches(Denson, 2013), the aviation navigation devices (Garmin, 2014).

All these examples provide a convincing picture; the current situation of the PND industry shows all the signs of the slope of enlightenment.

# 6. CONCLUSIONS BASED ON THE EVIDENCE FOUND.

## 6.1 Associations with documented failures of the hype cycle.

The question that needs to be answered here is: is the PND industry stalled along the way towards maturity? What measures have they taken away from these stalls? This question needs to be answered to determine how far along the companies are in reaching the plateau of productivity.

Niche Technologies:

They have chosen for many, and big, market segments see section 5.7.

Phoenix Technologies:

The situation "phoenix technologies "is based on the assumption that a company overestimates/exaggerates the abilities of their products. During the search for the

characteristics of the different stages evidence was found that contradict this definition. There was no mention of design flaws that were kept, of technologies that were wrongly implemented.

Extinct technologies/Ghost Technologies/Sleeper Technologies:

There is no evidence to be found that the current state of the industry can be associated with a ghost extinct or sleeper technology. This can be based upon the following evidence: Regarding *the Extinct technology*, there are 230 million turn-by-turn devices used. (Insight, 2013) Regarding t*he Ghost technology*, the PND industry is not scarred by any disasters, to the market or the technologies used. Regarding the *Sleeper technology*, the PND industry shows no evidence of applications that current technology can not yet achieve. Most applications are expensive to implement and develop.

Embedded technologies:

The last technological stalls that need to be discussed is the embedded technology. As discussed there is evidence that the players in this industry are making moves toward the car manufacturers, which would be a step in the right direction.

## 6.2 The relation between the industry and the hype cycle?

This part of the thesis is of paramount importance, there was a trigger, there was a rise, there was a fall and the early signs of a new rise are already noticeable. However, are these aspects enough to base conclusions on? This closing argument section will be enfolded in three subsections: Expectations and profits (the Y-axis), Time and duration of the stages(the x-axis) and feasibility of the suggested characteristics (other than expectation and financial gain)

First,. The Stock Portfolio of the 2 biggest companies in this field show a remarkable resemblance with each other. (Figure 1 and Appendix b). Furthermore the peak of inflated expectation around 2007 clearly shows. So, based on the expectations derived from stock analysis there is ground to make the assumption to match

To provide an answer to the second section reference should be made to section 5.3. The PND industry has shown the aspects of a long fuse technology, this entails the following: it will be a process spread over at least 20 years and the hardest/longest period will be the disillusionment. This section has been answered in the second part of the paper, the troubles companies had for the last four years show signs of the extended disillusionment. The other kinds of technology mentioned by Gartner are not feasible for the PND industry because otherwise they would have already reached the stage of productivity.

The last aspect that needs to be determined are the contradicting factors surrounding the different stages. In this thesis a lot of evidence has been formulated that coincides with the hype cycle, but there were certain aspects that did not fit entirely. These aspects will be unfolded in the following section, and they are framed with notions that could implicate that Gartner's assessment still fits.

The trigger described by Gartner is normally based on a technological development. The trigger of this industry was a decision of the government to allow access; therefore a statement can be made that the trigger had already happened before 2000. The statement made by Gartner on technological breakthroughs or early success stories, the assumption can be made that the actual breakthrough happened during the cold war. The real start however was around 2000 when the United states government unclassified their satellite program.

All aspects of the peak can be found but the only aspect that does not entirely fit in to the hype cycle stage is that this stage was far shorter then suggested by Gartner. Although the stage includes the rise towards the peak and the slide down from the peak, the seemingly small time it took the companies to arrive at the disillusionment could be a factor to consider whether to decline the matching principle.

Because of the distinction made by Gartner that there are different times to maturity, it could be a sign that this form: "a long beginning and a long valley" is simply another representation of Gartner's Technology types. In this case it would be defined by a long fuse in the beginning, and a long fuse towards the plateau of productivity.

Lente Spitters and Peine studied the different shapes of the hype cycle (Lente, 2013) and found out that, although all essential parts of the cycle are included, no hype cycle is the same.

Another aspect that did not fit within the characteristics of Gartner's model was the Price strategy by Magellan. The models predict high prices to win back invested money, but Magellan chose to make the cheapest possible devices in the market. Although Magellan uses low prices, they are still motivated by the notion that they need to get their invested money back.(Maggelan,2004)

The research showed early signs of later stages, there was evidence that characteristic aspects of some stages were included in other stages. For example in 2005 Tom-Tom already had partnerships with Fiat. The characteristics of each stage mean that the efforts surrounding these aspects were high in a certain period, Gartner does not state that they can only happen in the specific stage.

# 7. RECOMMANDATION

The Conclusion will be divided into implications for scientific research and the Recommendation towards the industry. Together they form an answer to the research question: Can a company choose to follow the path suggested by Gartner, or is it doomed to follow the path towards creative destruction?

## 7.1 Recommendation for the PND Industry.

### *7.1.1 First, avoid the problems of getting stalled*

Although this research suggests that the current position of the PND industry is not the result of being stuck in the problems mentioned in part 4, these problems are the focus points when trying to reach the plateau of productivity.

Embedded technologies:

Embedded technology should remind the players in the PND industry that the adaptation of their product as a standard in another product should be considered a high priority.

Niche technologies:

Niche Technologies should remind the players in the PND industry to focus their efforts towards a niche they fully understand and that the scope of this niche determines the height of the plateau of productivity.

This means that the newly applied focus towards using PND's, for example in fitness, needs to be firmly backed up by the affirmation that this is a big enough customer segment to focus on. The current players have already proven to adopt this strategy by focusing on a bigger customer segment: car manufacturers instead of the end users.

As suggested in section 6.1 the guidelines derived from phoenix, sleeper and ghost technology are not fully adaptable for the PND industry. The following stated situations should however be avoided at all costs:

Phoenix technologies:

Regarding *Phoenix Technology*, when overestimating results starting to show at the last stages of the hype cycle, there is a problem with the way management operates. At the peak is "overestimating results" not that important, but at a later stage it can be lethal. Management should learn from the earlier stage: The trough of disillusionment. When this is not the case, management must assess their history to determine if they are making the same mistakes.

Sleeper technologies:

Regarding *Sleeper Technologies*, Management should not try to adopt technologies that are not feasible to use. For example, do not allow the Navigation device to fly the car, because technological speaking: Mankind is not there, yet.

Ghost technologies:

Regarding *Ghost Technologies*, A product, that is not yet in the last stage of the cycle, can't afford scandals. Exploiting the issues, making an Tom-Tom just for women, should be a focus, but taking sides( only make for men) can scar the future of the product.

Extinct technologies;

Regarding *extinct technologies*, this definition embodies the notion of creative destruction. This situation rises when a company has chosen to stave of creative destruction but failed to take the proper action. This process can spring from all other stalled situations. It profit should learn from products that failed to adopt, Look back to the take overs in the history of the PND. Teleatlas, Navigon, Maggelan , all disappeared and the surviving players should use the knowledge derived from their faillures.

### *7.1.2 Secondly, mind the four value gaps:*

To determine what the PND industry can expect from the products, the companies need to understand what problems can rise at each stage of a innovation.

Performance problems:

Performance problems occur in three different stages.

*The embryonic stage;* In the early stage of the life of the technology there is much risk associated with the required level of performance. To tackle the performance problems in the embryonic stage the organization needs to create the possibility for feedback. To do this customers need to be involved in the developed application of the technology from day 1.

*The emerging stage* teaches companies to map the limits of their products. They cannot let the customer expect that technology provides them with a function, when it does not. So make clear and decide statements about features that can be assumed. Ignoring these problems will lead to disappointment, and therefore less sales.

During *the early maturity*, the companies need to focus on where and how the price/performance ratio can be maximized. The lesson here is: do not underestimate the assumptions users make. When they are given self-parking function, they expect that it can be used every time and every place. Because this function does not entirely work like this, it should not be a factor when determining the price of a product.

Integration problems:

These embody the issues surrounding: Adapting or Adopting. Organizations can fail because their products are not compatible with the environment. The product should be able to be used at all times indicated. The PND industry will need to develop products that are not just unique, but can be adopted. They should not provide services that need to be adapted before using. The companies should have retrieved all knowledge about integrating products during the fall of demand in the last 3 years. They should have accumulated lots of feedback and should be able to fix all integration problems that have risen.

A more practical argument, regarding these problems, would be that a Portable navigation device should not have any problem with any vehicle on the market. Otherwise consumers need to visit a garage, to install their product. This inconvenience will result in a dip in demand.

Penetration problems:

Penetration problems arise from the separation of developers and users. The developers are not able to envision how the user will perceive their product. In the PND industry this concept could be implemented if developers would ask what a person wants, instead of determining what could be useful. So instead of developing new features, mimicking them from competitors, adopting new features when they arrive, users should be asked what they prefer. With that knowledge development can begin. When Penetration Problems are not addressed in the company the products can become Phoenix Technologies (see section 3.4.3). When a company cannot change the way management blindly follows hypes, the companies will not survive this industry.

Payback problems:

These problems are associated with "the challenge in the early stages of an innovation's development is to estimate its potential payback in the face of unknown risks and uncertain benefits". So financial overestimation on amounts and time, and can be associated with all Time Gaps mentioned in this section. For example when a project is delayed, the expected benefits are delayed and there will be less funds available than expected. Decisions should not be made in this industry based on yet to be gained capital.

To close the Time Gaps, organizations should manage customer's expectation, customer's participation, and risk free finances.

### *7.1.3 Knowledge provided about the last stage of Gartner: Fly as high as you can!*

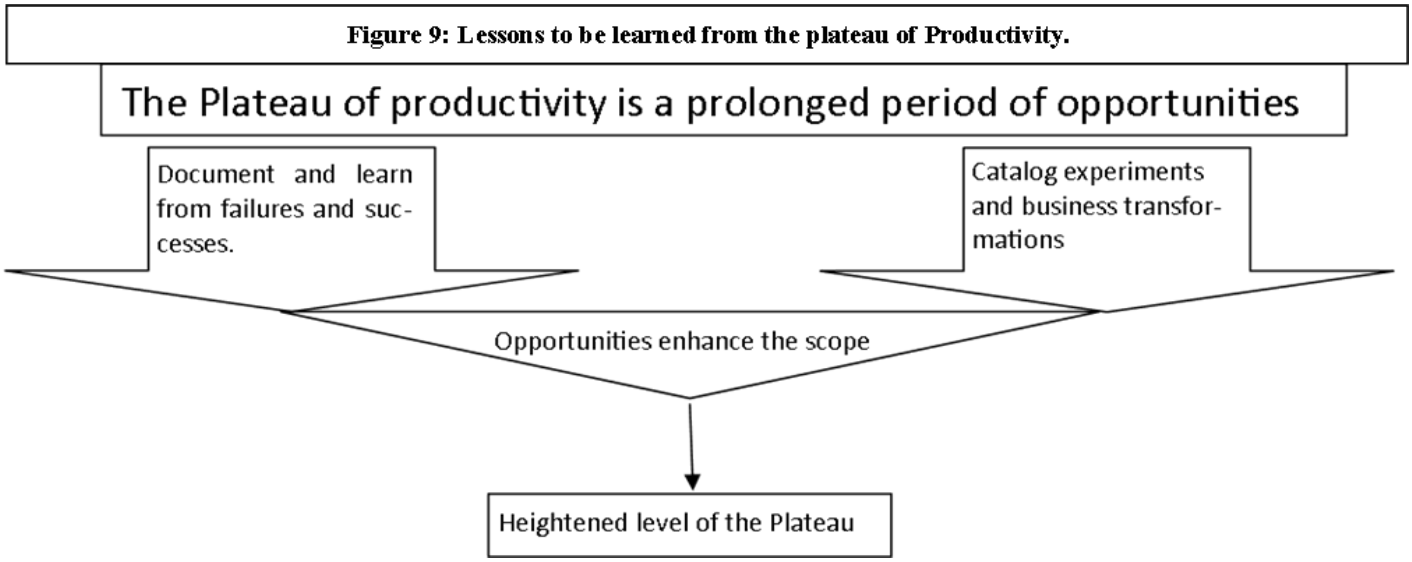
The differentiation made in section 3.3.5(figure 7) has to be imprinted into the mind of every company operating in this industry. Now that the validity of the hypothesis is established, companies in the industry can assume that within 5 years the plateau of productivity will be reached.
The most influential factor of this stage is the reach of the technology. The organizations should focus on the niche/ segments they chosen, and asses what this focus means for the future. A small niche will lead to a LowLander Hype cycle and will be disastrous for multi-national organizations.

Although it is not feasible to provide a guideline for becoming a true High Flier, This thesis will provide the companies operating in the PND industry with focus points, which would enhance the probability of maximizing the true value of their products:

- An opportunity heightens the plateau of productivity.
- The plateau is a prolonged period of opportunities.
- Catalog experiments and business transformations.

A Picture of the recommended focus points derived from the Plateau of Productivity can be found below (figure 9). These notions strengthened the advice made in section 4.4: Make only decisions when there are no unknown risks.

**Figure 9: Lessons to be learned from the plateau of Productivity.**




Al these aspects are embodied in the following quote of Fenn:

"The hype cycle highlights the need for continual, ongoing awareness about your own decision processes when faced with never-ending waves of potential innovations, Over the coming decade, you, and the organizations you work for, will be adopting innovations faster than ever before." (Fenn, 2008)

## 7.2 Visualizing the recommendations.

A visualization, model 2, was made to group the recommendations.. First an organization needs to assess their products to determine if there are commonalities with the hype cycle. When a company finds this connection, they can make the choice to arm themselves against creative destruction. Gartner found two different kinds of threats, Problems and stalls, when a company tries to reach the plateau of productivity. These two treats can be countered by building two hypothetical walls around an organization. The first wall should focus on avoiding and learning from stalled situations, and the second wall should focus on high performance by avoiding and learning from the four problems.

# 8. CONCLUSION

## 8.1 Working along the hype cycle or falling back on creative destruction.

This paper has argumented that, if a company is willing and able to put in enough effort to close the gaps, mind the failures, and not get stalled, they can force the hand of creative destruction.

Being victim of creative destruction does not take effort, exploiting the hype cycle does. The hypothesis, the decay in the "portable navigation industry"" is part of a valley, *as suggested by the model of* Gartner, and is in extension no phenomenon for the failure of the industry, as *suggested by creative destruction,* seems to be true, under certain conditions. It means:

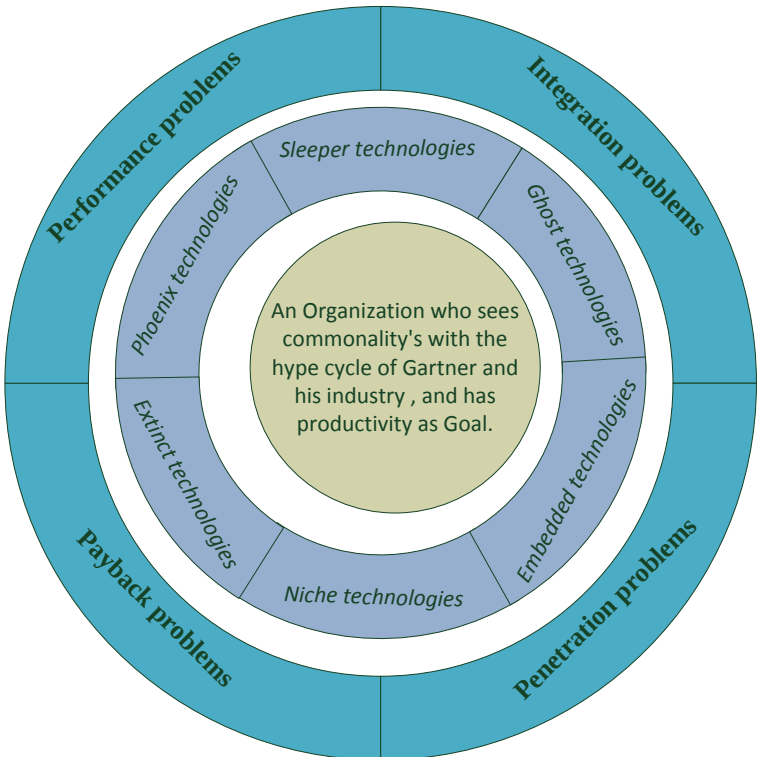
By,

Abiding to guidelines,

*(Derived from the stalling problems of the hype cycle),*

Closing the time-to-value gaps

**Arming against the treat of Creative destruction by building walls with the sole purpose of countering the issues surrounding the Hype cylce of Gartner.**




**Model 2: Visualizing the recommendations**

*(Associated with the third and fourth stage of the hype cycle)*

and implementing the 'productivity' knowledge

*(Provided by the last stage of Gartner),*

Creative destruction can be avoided and the true value of a product reached.

This thesis implicates that the assumptions surrounding creative destruction are not entirely true. It is a process that can be delayed by proper management. Proper meaning, fully devoted to all aspects mentioned in the section above.

When the implications of this thesis are translated into model 1, we can assume that there is a choice as suggested. But following the path towards productivity will take effort, this can be seen through the separation of the High flier and the LowLander. When a organization does not take all aspects of the recommendation into account it will follow the lowlander path, when all recommendation (model 2) are adapted adequately an organization becomes a true High Flier. See Model 1.2.

# 9. LIMITATIONS

In this section the critics on the hype cycle will be discussed together with the assumptions made during this research.

## 9.1 Limitations of the Hype cycle.

One of the limitations of the research is the description of the trigger phase. The vague definition 'early success stories' can be stretched out over decades. This research claims that the trigger in de PND industry was the statement from President Clinton, but there are two "stories" in the PND industry that supersede the statement.

First off, the following question could be asked: Could the proposal of USA President Reagan be the trigger instead of the statement made from Clinton? After a plane crash in 1983. The following happened:

*"It eventually led Reagan to offer the world's civil aviation operators free use of the then military-only, Global Positioning System (GPS)"*,(Degani, 2000)

During the research the trigger phase was addressed and the Clinton speech had more resemblance with the hype cycle. For example Reagan's proposal was for civil use, not explicitly for commercial purposes.

The other question that should be discussed here is the fact that Magellan introduced a commercially viable navigation device in the year 1987. (v3(uk), 2013)This product would be the first prototype but would also be a development before the trigger happened. This prototype used less accurate data of the US government to give an estimate of the location.

These two success stories make the trigger a period of almost seventeen years. Gartner did not add a time frame to the definition "early success stories". This does not influence the evidence of in this thesis. It is however, a hard characteristic to put a finger on, and therefore the validity could be low.

A similar limitation can be found in the characteristic "Cautious company stay on the background"

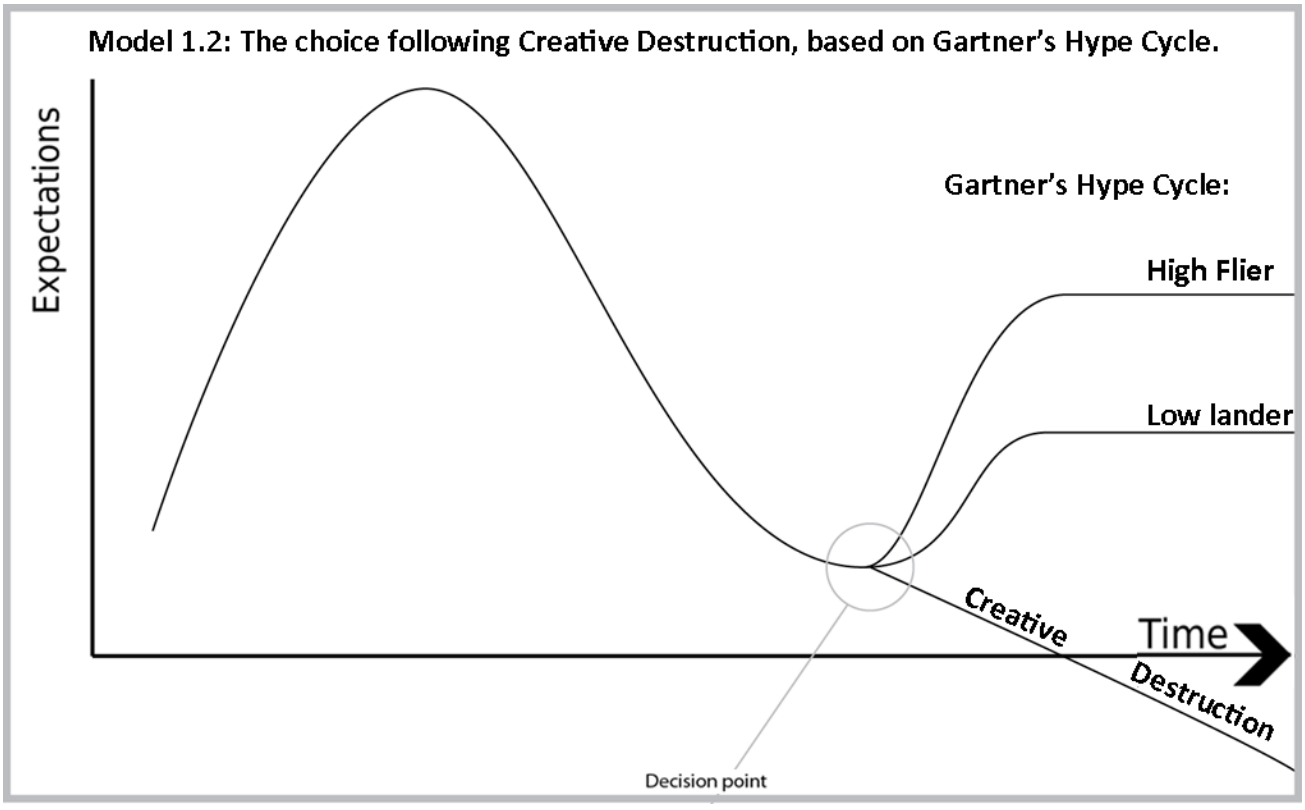
Cautious companies in the current stage of the industry implicate that other companies will emerge around this time. The model does not provide measures to identify or counter the emergence of cautious companies.

Unfortunately, Gartner's Hype Cycle does not predict extinctions. Nick Gall (Gall, 2008) asked a very interesting question regarding the hype cycle of the Gartner Group. Does the hype cycle suggest that the plateau last for decades or for centuries. Gartner has not published an answer to Galls question. But the question showed a limitation of the completeness of the model.

These industries, and others, are quick growing and cannot be controlled by risk adverse companies. So when the assumptions about the PND industry are true they could have implications for this highly technological, highly competitive market. It could do the same for other technological and creative industries. These implication for other markets need to be substantiated by more than just evidence from the PND industry.

## 9.2 Further research.

As mention in the limitations there will be a need to backup



these claims by more industries then just the PND.

A connection has been found between a highly technological industry and the hype cycle. So future research could focus on which other industriescan benefit from these insights.

The introduction of this paper mentioned the highly technological sectors: machinery and computer equipment; electric/electronic equipment; transportation equipment measuring instruments; computers and office equipment; electronics; medical instruments and drugs(Rao, 2008).These sectors give an indication of the possible directions for future research.

From this research, and Garters insights, a basis is made for the assumption, that not only the PND industry can be "navigated" by the use of the hype cycle. Other technological products operating in de sectors addressed by Rao (Rao, 2008) can be assessed too.

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# 11. APPENDIX A

**Table 2:** The Through of disillusionment and the Slope of enlightenment.

| | |
|---|---|
| **The slope of enlightenment** | |
| *Understanding benefit and practical application* | • The contract with EagleRider Shows that they understand the utility of their products for motor cyclists (Reuters, 2014);<br>• The benefits are exploited of build in PND's (Techno associates. (2013);<br>• The benefits of Social media on PND's have been found twitter(gpsratings,2014);<br>• The benefits of becoming green have been exploited by Fuel efficient driving(Gps ratings, 2014) |
| *Diversification in the application of the product* | • Safety applications are added :integrated dash cam (Magellan, 2014) ,<br>• Devices are made for marine and aviation purposes. (Keulen, 2013),<br>• the Gps Watches Shows the utility of other forms of Personal Navigation Devices(Denson, 2013),<br>(Garmin, 2014). |
| *Second/third generation* | New generation new functions:<br>• An integrated dash cam (Magellan, 2014) ,<br>• Weight and calorie censors (Griffin, 2014).<br>• Marine and aviation applications. (Keulen, 2013) (Garmin, Explore: In the air, 14);<br>• , the Gps Watches (Denson, 2013),<br>• The New TomTom 40, 50, 60(tomtom, 2014) |
| Rising expectations | • The NRC is reporting growth in the profits of TomTom<br>• so does RTL (RTL, 2014).<br>• Tadena wrote that :Gartner has also found himself exceeding expectation in the last quarter of 2013 (Tadena, 2013).<br>• And Kuittinen mentioned that: Gartner is even outperforming his competitor Apple, what nobody ever expected (Kuittinen, 2013).<br>• Tom-tom 40,50,60 have Internet access through smartphone, this is an long expected step.(tomtom,2014) |
| Conservative companies stay cautious: | They are cautious in the current state, not many organizations fit this description. See discussion |
| **Through of disillusionment** | |
| *Target market* | • Towards a younger crowd:<br>Android market((TomTom, Corporate TomTom, 2012)& (Magellan, Magellan smart GPS Apps, 2014));<br>• The railway market: It can be used to exploit rail crossing warnings( Leon, 2013) |
| *Understanding the entire product* | • The safety factors addressed can be seen as understanding the products(Tomtom.com, 2012);<br>• (Nusca, 2011) ;durability of roads and environment can be influenced and assessed(De Baets,2010)<br>• Internet will provide useful back up: The New TomTom 40,50,60(tom-tom, 2014) |
| *Positioning the product* | • They positioned a product only for Women : Tom-tom White Pearl:(ga,2009) |
| *Marketing strategies* | • Android app:(TomTom, Corporate TomTom, 2012);<br>• They choose to lower expectations: (Nusca, 2011) |
| *Distribution channels* | • Android app. (TomTom, Corporate TomTom, 2012) & (Magellan, Magellan smart GPS Apps, 2014).<br>• Garmin Partners with Suzuki and Chrysler (Garmin, 2013) |
| *Pricing* | • Both TomTom and Garmin slashed their prices (Hesseldahl, 2009);<br>• TomTom's software and devices include roughly $90(Kawamoto, 2010);<br>• refurbished high -end GPS devices have dipped below $50 on eBay(Salkever,2010) |
| *Experimenting* | • Women : Tom-tom White Pearl:(ga,2009);<br>• Garmin Phones in 2010 (Leber,2013) |
| *Investigating competitors* | • Android app: (TomTom, Corporate Tom Tom, 2012):<br>• Garmin Phones in 2010 (Leber,2013) |

**The slope of enlightenment**

**Through of disillusionment**

**Table 3:** The technological trigger and the Peak of inflated expectations.

**Peak of Inflated expectation**

**Technological trigger**

| Peak of Inflated expectation: | |
|---|---|
| *First Generation* | • *TomTom Navigator. (TomTom, Corporate TomTom);*<br>• *Garmin's Street Pilot (Garmin, 2001)* |
| *High prices* | • *Garmin's Street Pilot(Garmin, 2001). Price = 377,95 dollar* |
| *Loss of customization needed* | • *From military use towards Commercial use (DSPO)*<br>• *Magellan made the products as cheap as possible to fit the demands to the common man:early stages of the peak price =100 (Magellan, 2004)* |
| *The beginning of negative press* | • *Evolution needed (Staff, 2009),*<br>• *In stat (IN-Stat, 2007) recommended in that the NPD should be replaced by Handset navigation poised.*<br>• *The influence on driving performance(Memarovic, 2007)* |
| *Lot of Failures* | • *TomTom has taken over Tele-atlas (TomTom, 2008) ,*<br>• *Mio's parent company MiTAC bought Magellan (Fletch, 2008) and Navman (Mitac, 2007)* |
| **Technological trigger** | |
| *Not yet working products, but early proof of concept* | • *The statement made by Clinton was evidence that the technology could be used with enormous precision(Clinton, 2000) ,*<br>• *Capabilities of GPS for military missions. (Dale, 1996)*<br>• *Reagan made the GPS available for public use* (Degani, 2000) |
| *Start Media influence* | • *The statement was extensively covert(Clinton, may-1-2000):*<br>• *In the EE times the statement was discussed: (Leopold, 2000)*<br>• *By the National business aviation association strongly supports the statement (NBAA, 2000)*<br>• *By space ref (Cowing, 2000)*<br>• *By About. Geography (second Rosenberg, 2000)* |
| *Start-up companies* | • *TomTom,*<br>• *Garmin,*<br>• *Magellan,*<br>• *Mio Technology,*<br>• *Navigon*<br>• *Lowrance* |
| *(Laboratory) Prototypes* | • *Army Prototypes: (Army technology,2014)*<br>• *Magellan's try to start before the accuracy was enhanced* (v3(uk), 2013) |
| *R&D Focus* | • *GPS cost more than $12 billion to develop and deploy. (DSPO)* |

# 12. APPENDIX B: THE HYPE CYCLES

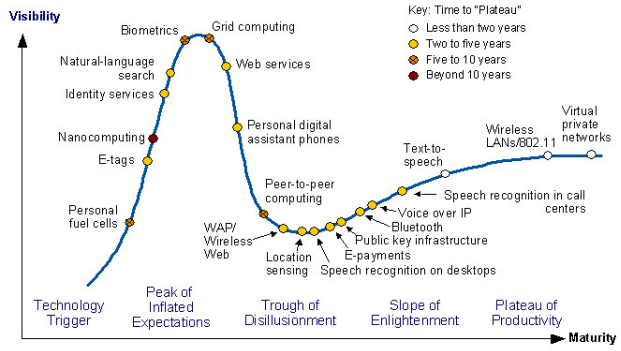


**Figure 10:** Gartner's **Hype cycle 2002.**

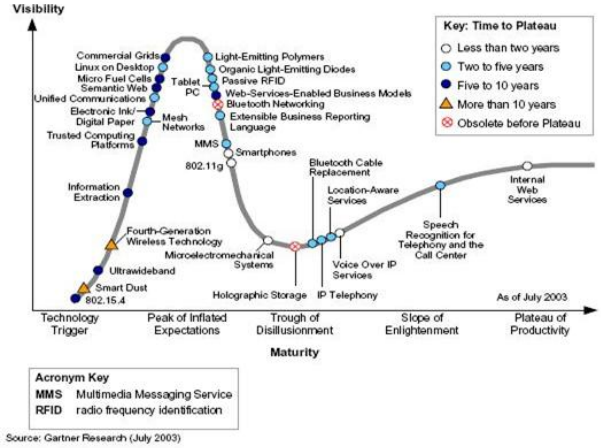


**Figure 11:** Gartner's **Hype cycle 2003.**

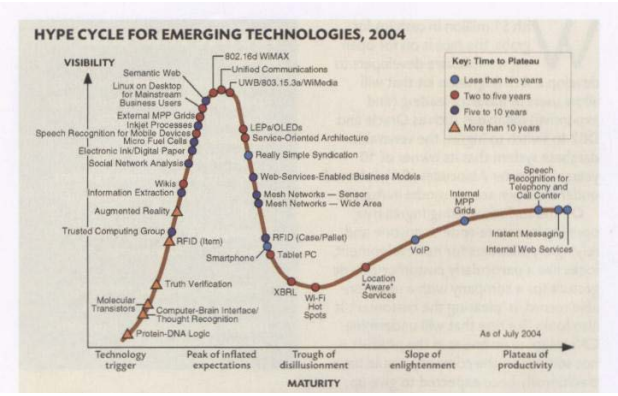


**Figure 12:** Gartner's **Hype cycle 2004.**

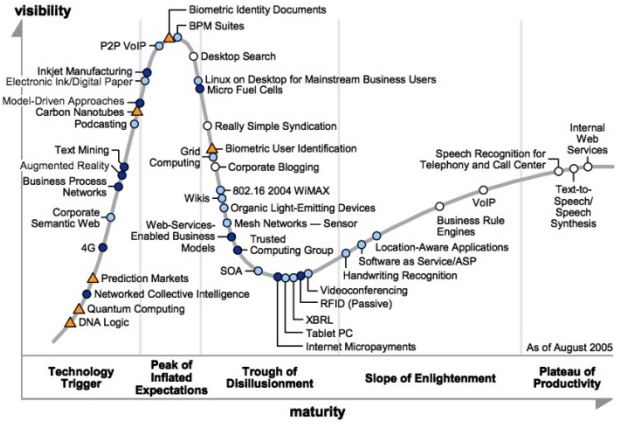


**Figure 13:** Gartner's **Hype cycle 2005.**

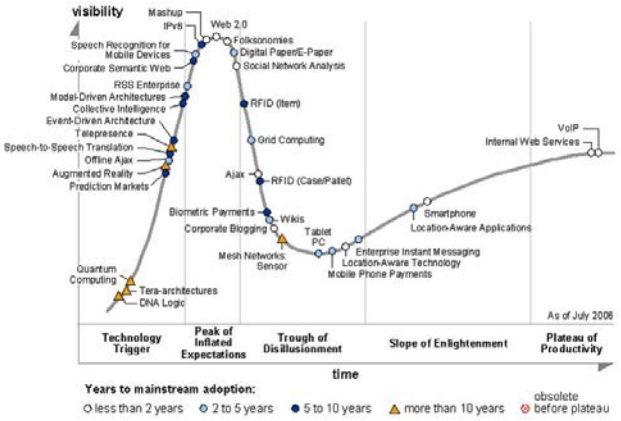


**Figure 14:** Gartner's **Hype cycle 2006.**

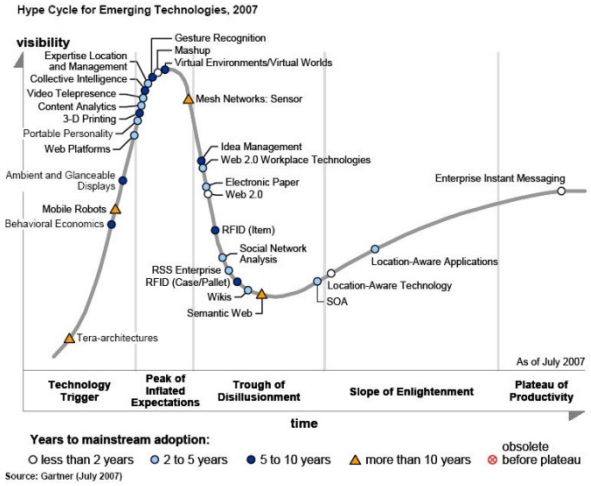


**Figure 15:** Gartner's **Hype cycle 2007.**

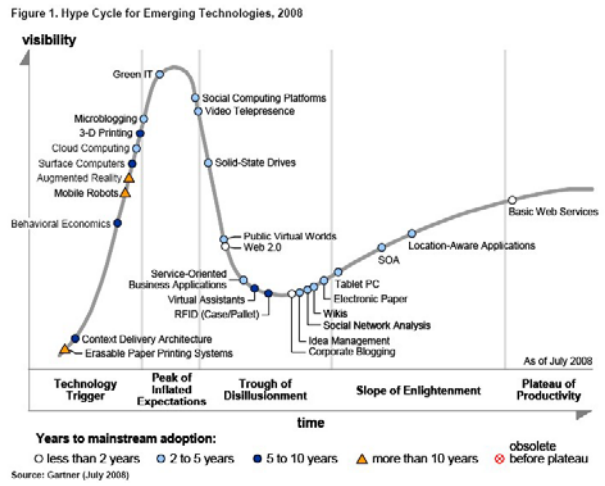


**Figure 16:** Gartner's **Hype cycle 2008.**

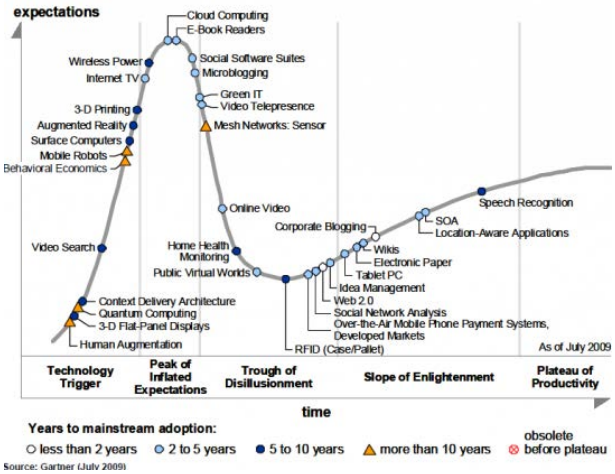


**Figure 17;** Gartner's **Hype cycle 2009.**

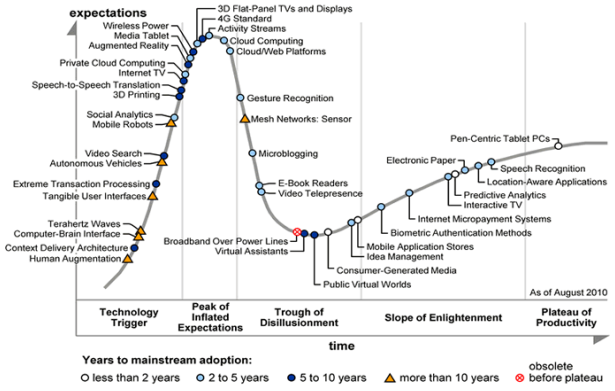


**Figure 18:** Gartner's **Hype Cycle 2010.**

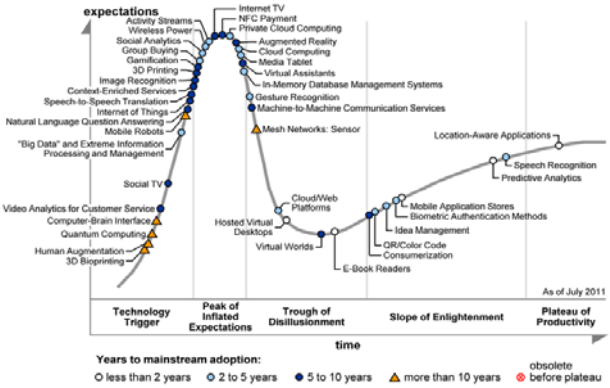


**Figure 19:** Gartner's **Hype Cycle 2011.**

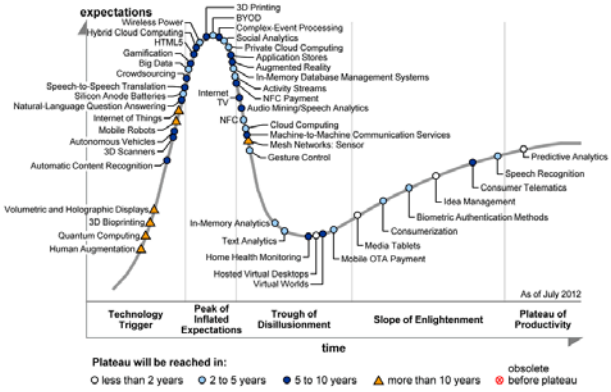


**Figure 20:** Gartner's **Hype Cycle 2012.**

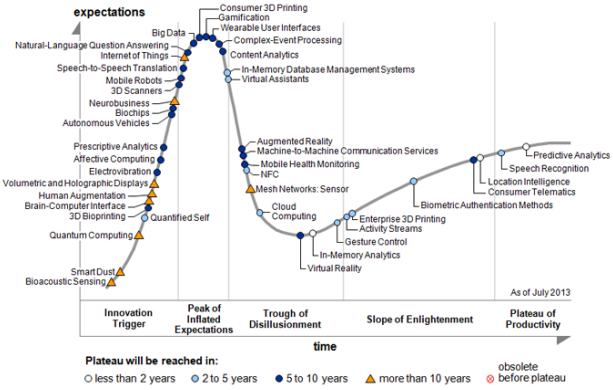


**Figure 21:** Gartner's **Hype cycle 2013.**

(Hype cycles are recovered from various image collection sites)

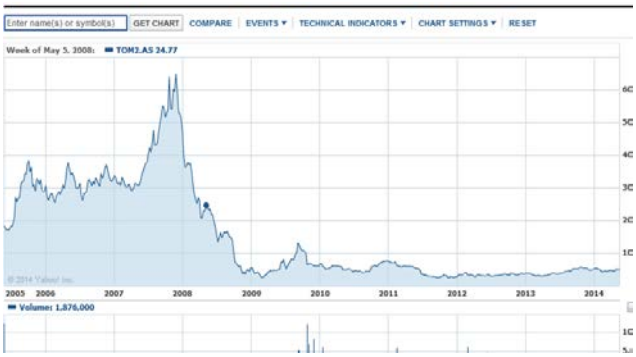


**Figure 13 TomTom stocks.**

# THE WHITE HOUSE

**Office of the Press Secretary**

**For Immediate Release** **May 1, 2000**

## STATEMENT BY THE PRESIDENT REGARDING THE UNITED STATES' DECISION TO STOP DEGRADING GLOBAL POSITIONING SYSTEM ACCURACY

Today, I am pleased to announce that the United States will stop the intentional degradation of the Global Positioning System (GPS) signals available to the public beginning at midnight tonight. We call this degradation feature Selective Availability (SA). This will mean that civilian users of GPS will be able to pinpoint locations up to ten times more accurately than they do now. GPS is a dual-use, satellite-based system that provides accurate location and timing data to users worldwide. My March 1996 Presidential Decision Directive included in the goals for GPS to: "encourage acceptance and integration of GPS into peaceful civil, commercial and scientific applications worldwide; and to encourage private sector investment in and use of U.S. GPS technologies and services." To meet these goals, I committed the U.S. to discontinuing the use of SA by 2006 with an annual assessment of its continued use beginning this year.

The decision to discontinue SA is the latest measure in an on-going effort to make GPS more responsive to civil and commercial users worldwide. Last year, Vice President Gore announced our plans to modernize GPS by adding two new civilian signals to enhance the civil and commercial service. This initiative is on-track and the budget further advances modernization by incorporating some of the new features on up to 18 additional satellites that are already awaiting launch or are in production. We will continue to provide all of these capabilities to worldwide users free of charge.

My decision to discontinue SA was based upon a recommendation by the Secretary of Defense in coordination with the Departments of State, Transportation, Commerce, the Director of Central Intelligence, and other Executive Branch Departments and Agencies. They realized that worldwide transportation safety, scientific, and commercial interests could best be served by discontinuation of SA. Along with our commitment to enhance GPS for peaceful applications, my administration is committed to preserving fully the military utility of GPS. The decision to discontinue SA is coupled with our continuing efforts to upgrade the military utility of our systems that use GPS, and is supported by threat assessments which conclude that setting SA to zero at this time would have minimal impact on national security. Additionally, we have demonstrated the capability to selectively deny GPS signals on a regional basis when our national security is threatened. This regional approach to denying navigation services is consistent with the 1996 plan to discontinue the degradation of civil and commercial GPS service globally through the SA technique.

Originally developed by the Department of Defense as a military system, GPS has become a global utility. It benefits users around the world in many different applications, including air, road, marine, and rail navigation, telecommunications, emergency response, oil exploration, mining, and many more. Civilian users will realize a dramatic improvement in GPS accuracy with the discontinuation of SA. For example, emergency teams responding to a cry for help can now determine what side of the highway they must respond to, thereby saving precious minutes. This increase in accuracy will allow new GPS applications to emerge and continue to enhance the lives of people around the world.

Figure 21: **The speech of President Clinton**