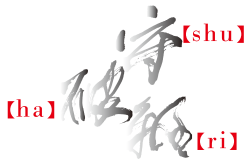
# Digital Act, Inc. Company Outline

# Table of Contents

# Executive Summary

## Management Policy

◆ **Digital Act's focus is intellectual property rights within the consumer electronics market.**




This company has built a strong business and developed excellent IP for the image transmission market. By not being restricted to the stereotypical defacto standards (*1), Digital Act continues to increase revenues by developing fresh new products and marketing styles, licensing technology, and through the sales of LSI systems, etc.

These businesses are achievable through an efficient management system which can expedite its decision making process to keep up with the fast pace of the information technology industry.

Our product development concept is the same as that of “information appliances.” The digital world, represented by DCT (*2) which has been developed for the PC industry, is different from the industrial world which utilizes built in analog technology and also integrated by Digital Act. The same concept as "information appliance" that digital divide isn't produced in the ubiquitous society. Japanese industry is ensuring that "information appliances" is on the come back and this company is taking the lead.

*1 This isn't meant to say that a "de facto standard isn't used" at all.
*2 The discrete cosine transform is used for lossy compression of a full color picture. Main image compression systems used by DCT are JPEG (an ISO standard) and MotionJPEG, MPEG- (an ISO standard) etc..

**The object is preserved,**
**The object is digitally torn apart (virtual reality)**
**We separate ourselves from the torn object to see its true quality.**
**Digital Act introduces a new generation.**

## Vision

- In order to produce next generation information appliances it is necessary to integrate them with the development of the 5 senses. The digital and analog divide will disappear and the end user must feel inspired and moved by the products.
- We achieve this inspiration through the discovery of new technologies, product planning and development, innovative business planning and marketing within the information appliance sector focusing on the image (still and animated).
- We strive to simply provide superior service and leading products to the market with strong IP and excellent human resources, along with a flexible and open minded outlook while working and developing alongside with some of the largest companies with which this company enjoys strong relationships with.

## Area of Business

◆ **Digital Act’s own IP and those products to which the IP is applied to**

| ● IP used | ● Target | ● Next generation |
|---|---|---|
| **FantaPix®**<br>Digital Act specializing in realistic print (analog) output, researched the reproduction of digital ultra-high-resolution imaging that made the best use of optical lens' properties, and succeeded in the development of its proprietary "loss-less compression and high-quality quantum restoration technology" (FantaPix) of which the image does not deteriorate. Patent No.3530844<br>**FantaPix features the following**<br>●PicoPixel enabling technology (high-quality quantum restoration technology)<br>●Non-deteriorating loss-less image compression technology | Digital camera<br>Mobile phone, PDA<br>Onboard recorder<br>Consumer electronics (image upconverter)<br>Image recognition<br>Multi function printer<br>Thermal sensor<br>Lossy less technology<br>Packaged software sales<br>Online software sales | AI sensor<br>Machine vision<br>Archiving<br>Next gen web environment<br>Ubiquitous (information appliances)<br>Entertainment |
| **Diep®**<br>Digital Act co-developed this audio/visual codec algorithm, which is based on the Zoran (image compression) and the AAC Group (audio compression) technologies with the Israeli company, Emblaze. The result is the industrial property rights to the LSI Asic AV media processor (Diep). | Video TV, Video conferencing<br>Medical, nursing, education, social welfare | |
| **Other** | Security camera<br>Information appliances | |

## Digital Act’s role and revenue model

- Our company is in control of all of the processes from product planning to sales. Providing manufacturing and sales licenses of our technology is our revenue model. Product sales through commissioned production of modular parts is also part of our business plan.

## Differentiation

- Exceptional at identifying strong IP’s. Introducing compatible products with our company's own IP based technology
- Utilizes strong relationships with expert companies, structure conducive to quick development
- strong IP and excellent human resources, along with a flexible and open minded structure while working and developing alongside with some of the largest companies

## Revenue Model

| | ● sales | (million yen) |
|---|---|---|
| • Software business<br>• Software package sales<br>• Development business<br>• Hardware business | 2007年 | 344 |
| | 2008年 | 580 |
| | 2009年 | 734 |

# DIGITALACT/ Corporate Vision

Representative Director
Kazuhisa Saito

In the past, consumer electronics were supported and developed with costly Japanese proprietary technologies and embedded microprocessors to produce convenient products. On the other hand, a strong push is made to develop multipurpose computers and that technology is being used to develop more efficient platforms for consumer electronics. However, it appears that the OS and standardization of personal computers restricts this kind of development.

The market has become less interesting due to the fact that manufacturers use many of the same technologies, which are monopolized and tightly controlled.

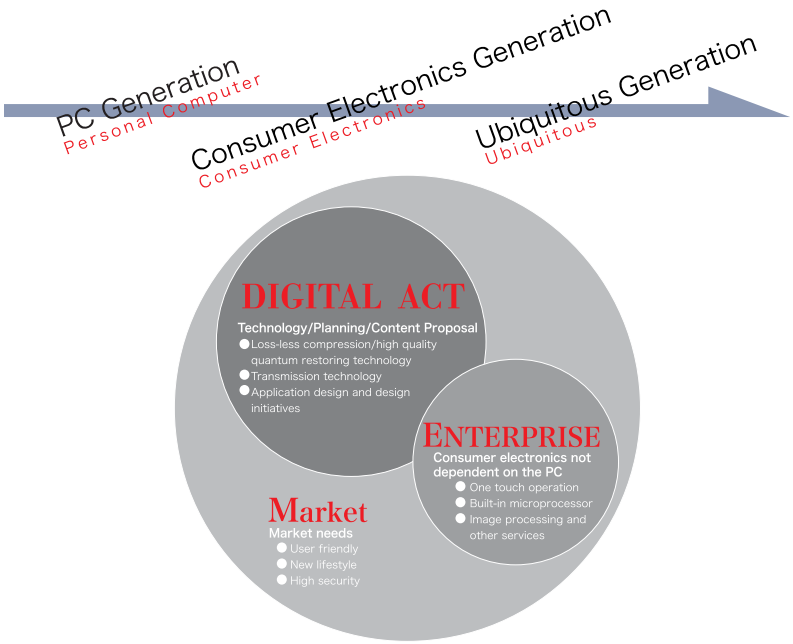
There was a time when a new age and sense of astonishment was felt when new and amazingly convenient products were introduced. Naturally, the consumer electronics market commands simple, convenient, and cost performing products. The next generation home information appliances must take into account all of our senses in order to create the most convenient devices. The objective is not whether to use digital or analog technology, but rather how to make the biggest and lasting "impression".

To create this "impression", Digital Act focuses on the image (moving and still) through high-tech discovery, product design and development. There are a number of standards or de-facto in the image processing field in terms of compression and transmission methods of images. However, when you try to catch the eye of the consumer with these standard methods, it is soon realized that they are only standard with a small part of the consumer group.

Digital Act is not caught up with the restrictions of these methods but instead it takes an "outside of the box" approach to quickly achieve results.

In order to provide superior service and quality products to the market, Digital Act relies on its quality staff, intellectual property, and open studio mind to pursue development with the same capabilities as a large firm.

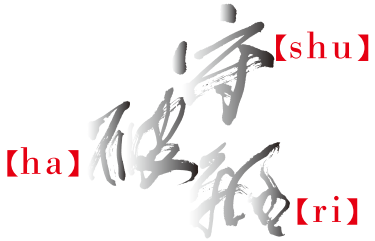
As part of Digital Act's current business, it focuses on developing superior IP such as AI sensing technology, black light sensor systems and content which can be projected as high-res images onto large screens, and developed naturally all within a profitable business structure. Digital Act's development is not restricted by stereo-types or de-facto standards. Instead, it creates new "impressive" products through its licensing business, system LSI sales business, etc. which provide a continuous revenue stream base. Digital Act concentrates on effective use of management resources which are appropriate for these businesses and pursues management efficiency with a prompt decision making system. Digital Act endeavors to contribute to the development of the information industry, in a region which excels in this domain.



# DIGITALACT/ Concept

Since Digital Act's establishment, the company has worked very hard through trial and error to develop and pursue new technologies in a deffernt manner from the traditional digital industry which has all but forgotten the analog approach in the creation of today's ubiquitous environment.

The Japanese industrial world is also moving towards developing "next generation consumer electronics", with common elements such as portability, internet connectivity, entertainment/media and every day life habits. Digital Act is a small company which leads the industry as a result of its superior engineering capabilities and received the highest award at the Industrial Economic Ministry awards event in March 2007 for its image processing technology.




In order to acquire information the hurdles that current hardware (PC's), peripherals, operating systems, software application, and communication infrastructure must be overcome and a new environment must be constructed to become a truly integrated digital society.

The proliferation is limited by these and the infrastructure investment cost on the distribution side is huge and ultimately the cost is past onto the end user. Furthermore, lifestyles will be a part of the information environment felt by all of our senses centering on the image. With the exponential increase of information, it is clear that problems with image processing will also increase.

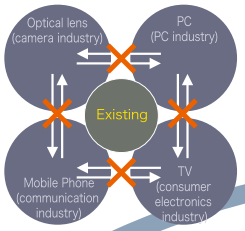
On the other hand, creating simple embedded tools made for consumer electronics which include outdoor elements to improve our lifestyles and make an impression on life, is important.

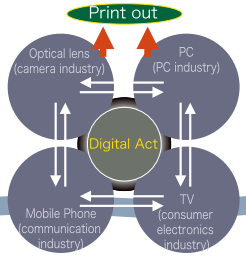
One way to achieve this is the use of power supply lines for communication transmission. The cable TV networks and telephone line systems are a big part of society's current infrastructure which also plays a large part of the Digital Act concept and vision.

In working towards developing concepts for consumer electronics and services and licensing our advanced technologies, Digital Act will work toward forming a leading informational think tank group.

Future world

Because methods for digital image conversion differs for each industry, there is no collaboration making it difficult to print out (analog output) and compatibility even more difficult.



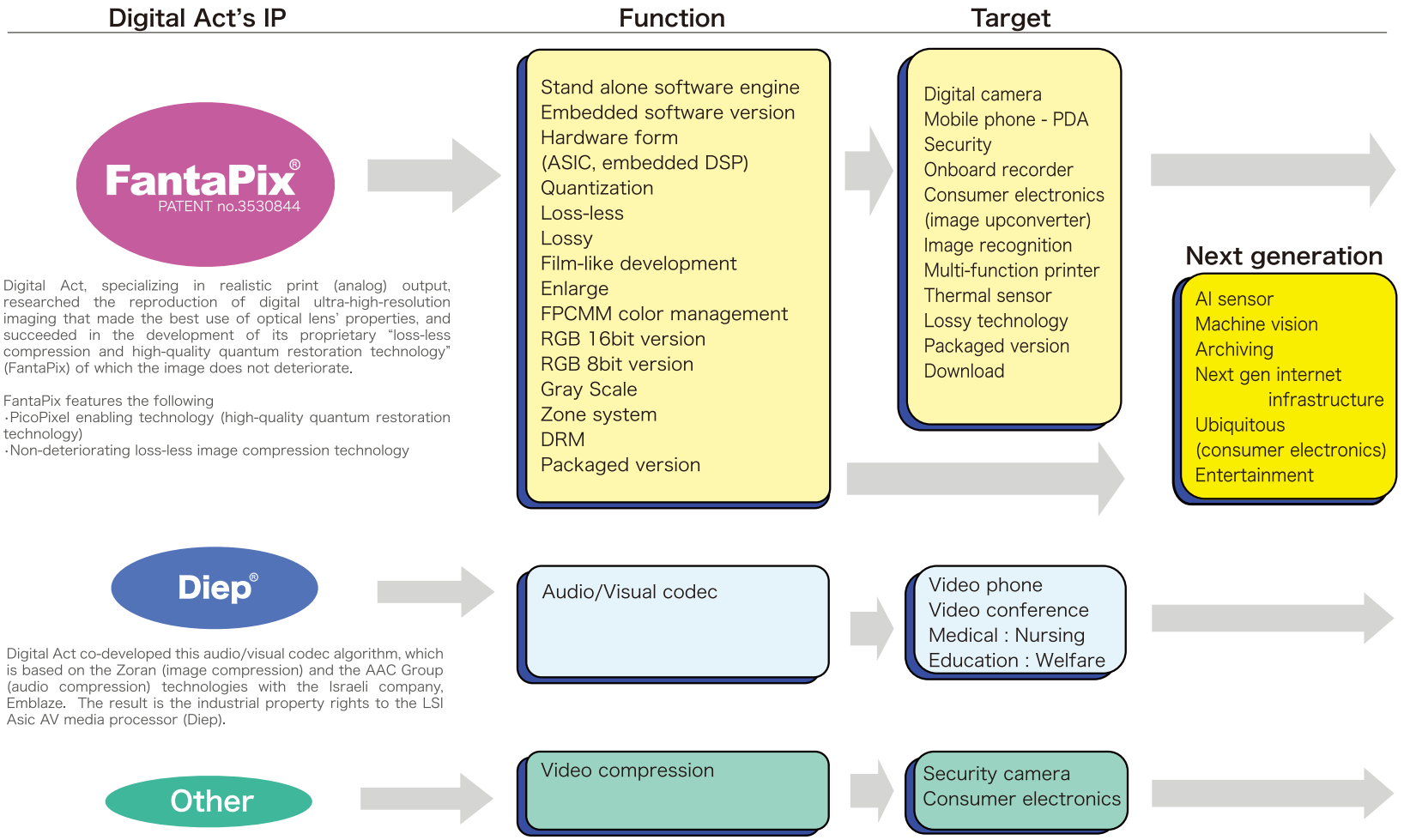

In order to improve Digital Act's technology compatibility, it aims to create a color management standard for the image output (display and print out)


There is demand to standardize the print drivers for images created from information generated from an optical lens. Within each industry there are attempts to develop a universal standard, however a conclusive solution is still pending. The development of the digital lens system P4L: PhotoPicoPixel Print for Lens, which bundles the color by converting the digital image into print data is quite advanced.

Present

# DIGITALACT/ Business Description

## ◆Introducing compatible products with our company's own IP based technology.



# DIGITALACT/Company profile

Company name : Digital Act, inc.

Established : December 3, 1999

Capital : ¥202,340,000

Company business : Development of telecommunications equipment, as well as software and hardware related to network equipment, desing, sales gathering of telecommunication information, processing and sales of such information, computer infomation processing.

Managing director, President : Mr. Kazuhisa Saito

Number of Employees : 20

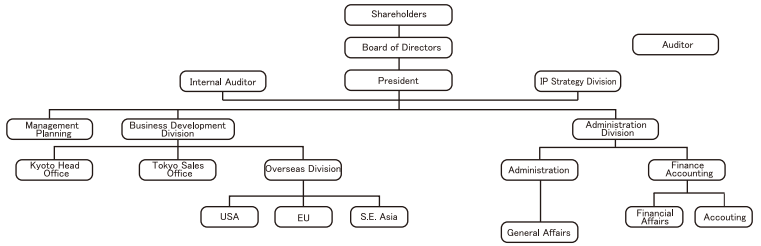
Kyoto Head Office : 8F Kawaramachi-nijo Bldg., 366 Ichinofunairi, Nijo Kawaramachi, Nakagyo-ku, Kyoto 〒604-0924
TEL : +81-75-212-4700 FAX : +81-75-212-4600

Tokyo sales / R&D center : Azabudai Flat 1F, 3-3-27 Azabudai, Minato-ku, Tokyo 〒106-0041
TEL : +81-3-3585-8272 FAX : +81-3-5572-7021

North America office : 3550 west 5th Avenue, Vancouver, B.C. V6R 1R9 Canada
TEL : +1-604-662-7592 FAX : +1-604-662-7590

**URL** http://www.digitalact.co.jp

**Organization**

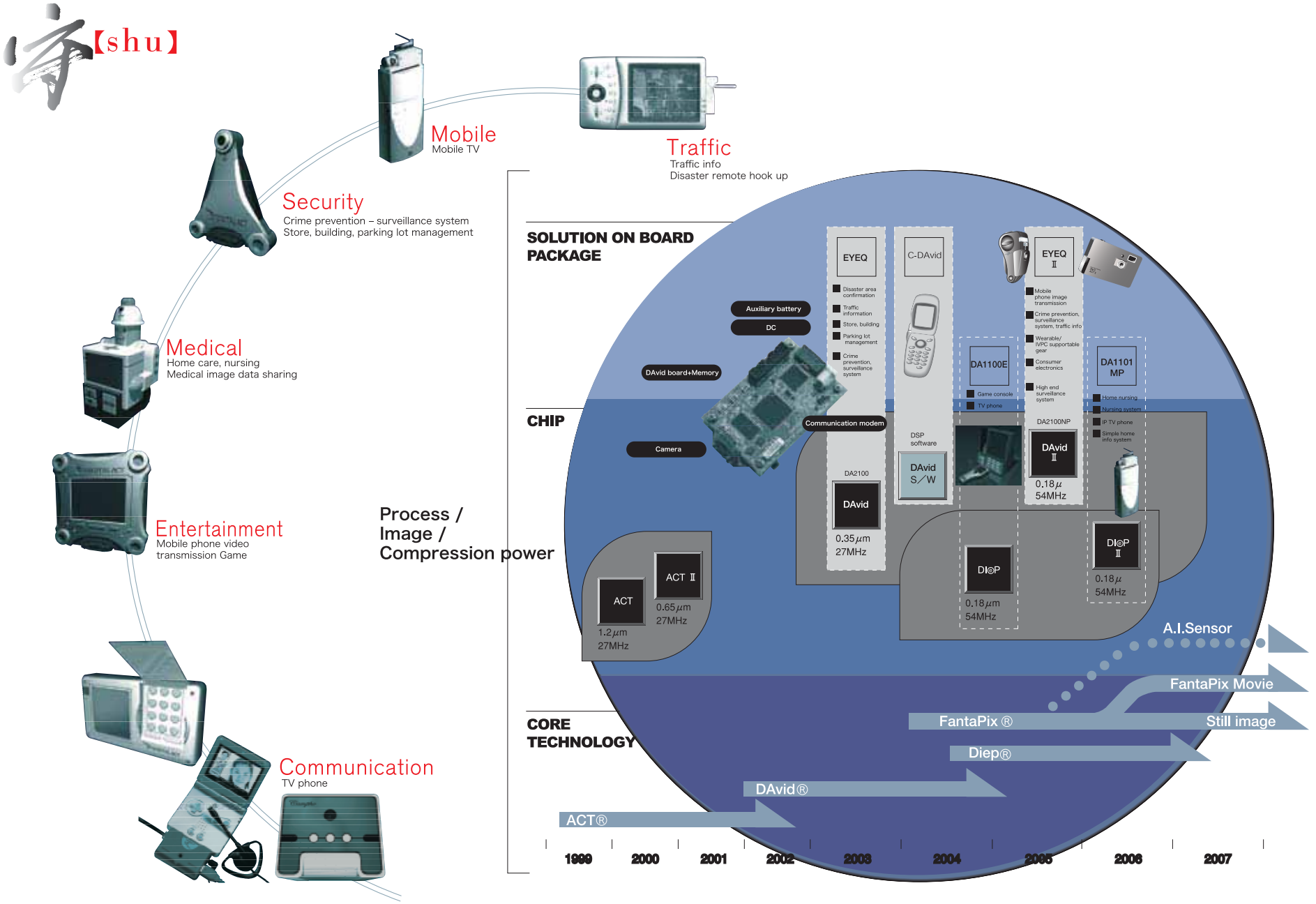



| Title | Name | |
|---|---|---|
| Representative Director | Kazuhisa Saito | |
| Director | Reiji Okamoto | |
| Director | Gregory Rozitis | |
| Director | Yoshiaki Takamura | |
| Director | Masanori Horikawa | |
| Director | Tetsuro Sawada | |
| Auditor | Tsutomu Funamoto | |
| Auditor | Nobuhiro Ohta | |
| | | |
| Advisor | Kazuhiko Nishi | |
| Advisor | Sadayasu Ono | |
| Advisor | Chiharu Hirabayashi | |
| Advisor | Monkey Punch | |
| Advisor | Sudo Koichi | |
| Legal Advisor | Yasuhiro Orita | |
| Legal Advisor | Chiemi Saga | |

# DIGITALACT/ Company History

| | |
|---|---|
| 1999/12 | Digital Act, Inc. established in Kyoto (Shimogyo-ku) |
| 2000/01 | Industrial property rights acquired from Nihon Securith Industries for ACT/DAvid Technology (video compression transmission technology) |
| 2000/02 | Head office moved to Kyoto (Nkagyo-ku) present location, Tokyo sales office established (Sunshine Bldg. in Ikebukuro) |
| 2000/09 | 『Encode ship embedded on PCI board』, 『Decorder) for Win98』sales launch |
| 2000/11 | 『Next generation time lapse surveillace digital recorder』 sales launch |
| 2000/12 | 『Realtime video transmission House Watching device for Win CE』 developed |
| 2001/03 | 『Realtime cideo transmission House Watching device for ZAURUS』 co-developed with Omron Software |
| 2001/12 | Tokyo sales office and R&D center moved to Minato-ku (Tokyo) |
| 2002/03 | 『DAvid LSI』 Asic completed |
| 2002/04 | 『DAvid PCI』 board complete |
| 2002/07 | Tokyo sales office and R&D center moved to Minato-ku, Azabudai (Tokyo) |
| 2002/10 | 『DAvid LSI』 sales launch |
| 2002/11 | 『Diep LSI』 sales launch |
| 2003/02 | 『CAMPHO』 engineering sample completed |
| 2003/07 | 『CAMPHO』 Nintendo certified product license acquired |
| 2003/11 | 『FantaPix』 (loss-less compression/high quality quantization compression technology) developed |
| 2004/03 | 『FantaPix』 (loss-less compression/high quality quantization compression technology) patend received (#3530844) |
| 2004/07 | 『CAMPHO ADVANCE』 sales launch |
| 2006/05 | 『FantaPix+』 Software package sales launch |
| 2007/03 | 『FantaPix+』 technology winner of 1st annual Kansai Front Runner Award (presented by Ministry of Economy, Trade, and Industry) |
| 2007/06 | 『FantaPix+ scanner version』 Software package sales launch |
| 2007/10 | 『PhotoPicoPixel Series』 download version annouced |
| 2007/12 | 『PhotoPicoPixel Series』 download version launched |
| 2008/07 | International patent application for "Method and apparatus for measurement of laughter" |
| 2008/12 | Development of next generation FantaPix " Super Enhanced FantaPix |
| 2009/01 | Announcement of "FantaPix Digital Cinema" La Boheme |
| 2009/02 | Start of development of "FantaPix Audio" |
| 2009/08 | Yomiuri TV program implements "Laughter Measurement Application" |
| 2009/08 | Optical resolution test board "FantaQualia" development start |
| 2009/11 | Optical resolution test board "FantaQualia" complete, sales |
| 2010/01 | Digital film business planning (Setagaya-ku, Tokyo) |

# Business Outline / Roadmap



# Business Outline / Intellectual Property Rights

【ha】

Camera
Digitalcamera

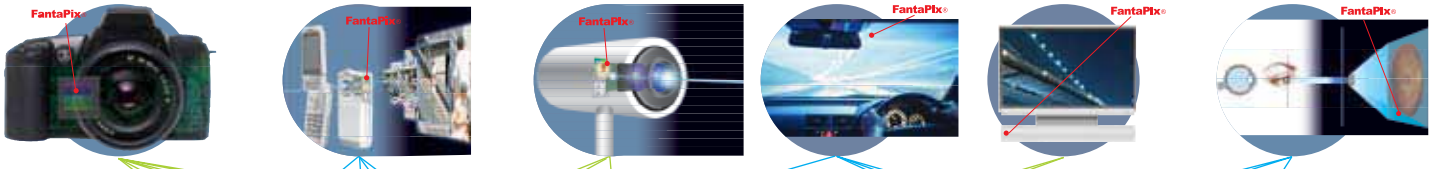
Mobile
Mobile phone･PDA

Sensor
Security

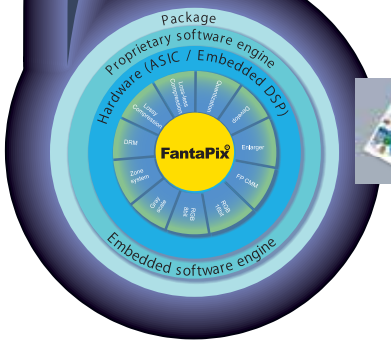
Automobile
On-board vehicle recorder

Upconverter
consumer electronics

Image recognition
Retina recognition




Package | Embedded software engine | Proprietary software engine | Hardware (ASIC / Embedded DSP) | Quantization | Develop | Image expansion | FPCMM | RGB 16bit | RGB 8bit | Gray Scale | Zone system | D R M | Loss-less Compression | Lossy Compression





Print driver
Multi Function Printe


Factory sensor
Temperature sensor


Past image

FantaZoom
Lossy Compression

FantaPix ＋
Package sales

PhotoPicoPixel series
Online sales

# Business Outline / Future Development

【ri】

A.I. Sensor / Machine vision

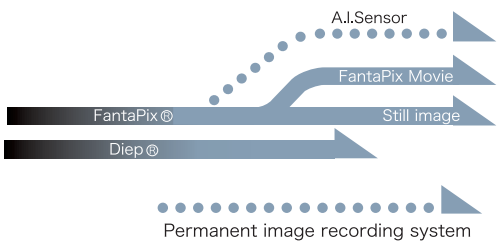
## Artificial intelligence

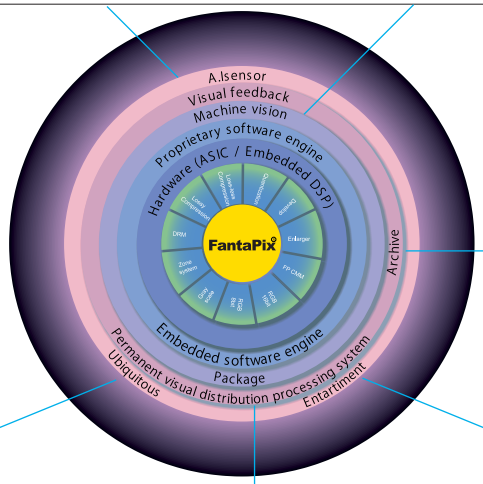
### Robot

The evolution of robotic sensing technology has come a long way.Actions are predicted following laws of natural energy and adopted which brings them closer to human actions.Research and development on algorithms for statistical expectation values is being carried out for the development of future operating environment robot applications.Digital Act collaborates on projects using remote sensing satellite imagery, visual and non-visual light techniques, re-sampling image technology to process images from EyeCatching, TEC, visible/non visible light rays and even wave forms for concepts using remote sensing and visual feedback such as Seeing Eye Dog and TEC.

### Automobile [ITS specification visual feedback engine]

Development of vehicular sensing technology for character and movement recognition has progressed significantly.The processing speed said to be impossible is achieved in the visual feedback in those control fields in the image data processing imagined from JPEG2000 etc
The effective results of improving the accuracy of the detailed morphology processing and the entire object image is offered with the high-speed processing.
Safe driving requires that information be transmitted at high speeds, thus the high demand for a specific vehicular image processing engine, which is currently under development.




Archive

## Permanent image recording system

[Digital papyrus]

Various artistic production and valuable documents such as paintings, drawings, literature, etc. are saved as images and the special image archiving devices are not yet perfected.
Research regarding recording devices for archiving loss less data, without deterioration for centuries is progressing.

Ubiquitous

## Information appliances

The ubiquitous generation has arrived.
In addition, all of the control for the electronic devices will be generated from them through content processing which will be built within.
If an analog wave form could be recorded in the form of a digital image, it would be possible to apply this to all objects.

Next gen network environment

## Permanent visual distribution processing system

Presently, picture storage, image processing and enlargement of contents quality cause overwhelming system problems of the internet environment which was not originally constructed to accommodate such traffic.Research and proposals which assure improvements in system environments with visual parallel distributed processing through the estimate of the future system loads are becoming advanced.

Entertainment

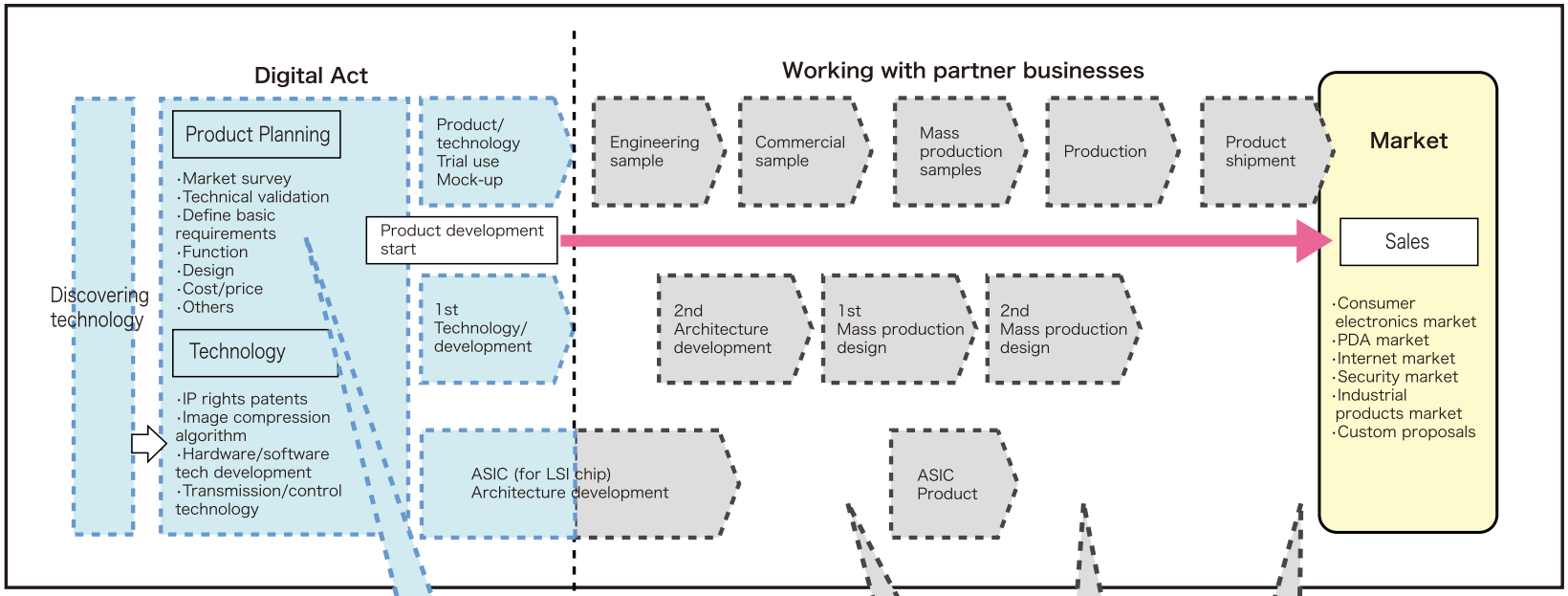
## Home theater

[Rael 3D screen/Next generation virtual reality space]

We increase the resolution to better depict images, to display film level contrast the optics are strengthened, to mimic live theater high vision large monitor systems are introduced into the household.
Three-dimensional imagery will be the norm in the near future and research on motion picture format for home theater use is progressing rapidly.

# Business Outline / Company Role

◆ Digital Act is involved in all aspects from product planning to sales. With this sort of flexible structure, we are able to distinguish ourselves with our technical excellence and product planning ability for rapid progress.




1. Product functionality, design and pricing is determined upon market trend survey and utilizes our key technology as a base.
2. Product and technical test mock-ups are created to match the market requirements
3. Based on the above, technical development is started

4. In the 1st architectural development stage, engineering samples are created to test basic design and functionality. Based on the evaluation engineering samples, the 2nd architectural development is started and commercial samples are produced.
5. Once the commercial samples are determined to meet the market's requirements, mass production design is started and manufacturer commences with production.
6. Shipment of product commences.

# Business Outline / Business Differentiation

## Business Model Differentiation

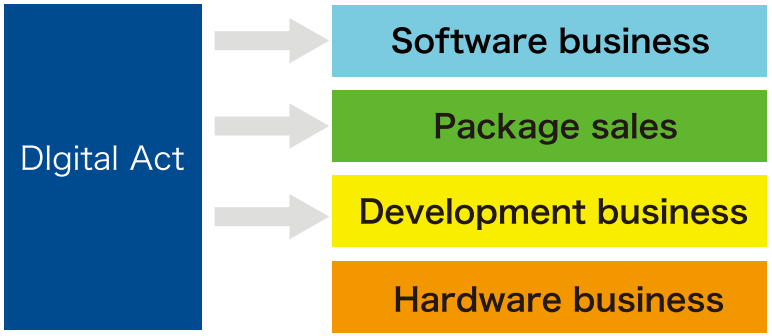
- Digital Act develops products and services which aren't restricted to present influences. With our new core algorithms we develop customized module products for the market.
- We leverage the power of large partner companies for manufacturing and sales to minimize inventory and overall cost risks. Partnering with leading manufacturers and large corporations allows us to utilized cutting-edge designs and manufacturing technologies and to get our products into the world market in the most efficient way.
- Our company organization is efficient which enables us to concentrate our management resources for research and development.

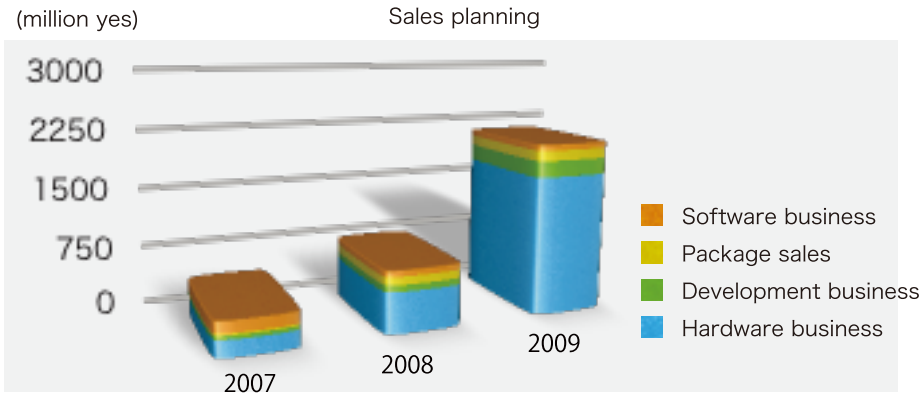
## Product and Service Differentiation

- Digital Act's proprietary image compression technology separates itself from the restrictive DCT technology promoted by large enterprises in this ubiquitous information society. Our technology addresses all of the current demands for miniaturization, light-weight, low-power in mobile devices, wearable PC's, etc. through the simple algorithm. Where is might normally take up to 4 years for a large enterprise to develop an LSI ASIC, Digital Act is able to complete the work in less than a year, using our advanced outsourcing capabilities. In order to maintain differentiation and development speed, LSI design is being considered internally at Digital Act.
- A simple algorithm for an IC chip is much more cost efficient with its low power consumption, smaller in size, and less logic count.
- Since the technology and algorithm are well established development time is reduced and products can be quickly produced for the marketplace to meet current needs.
- Please see p.17 to review a comparison with other competitive products in the marketplace.

# Business Outline / Revenue Plan

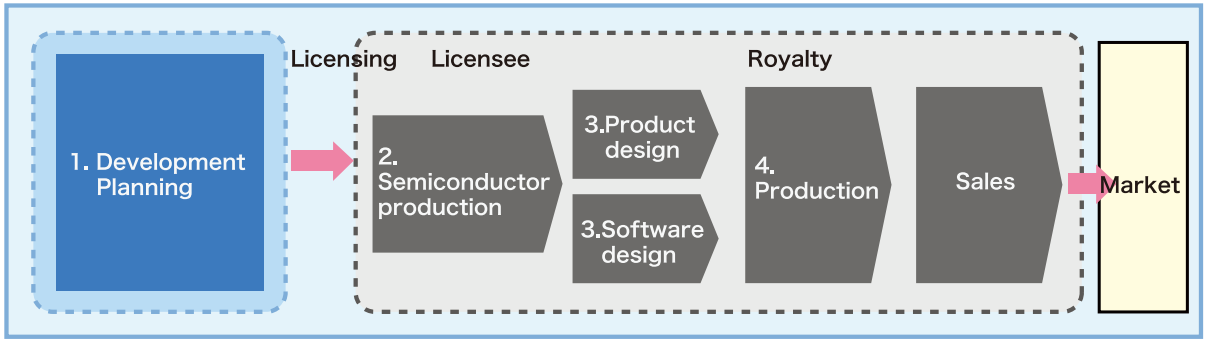
## Revenue Plan



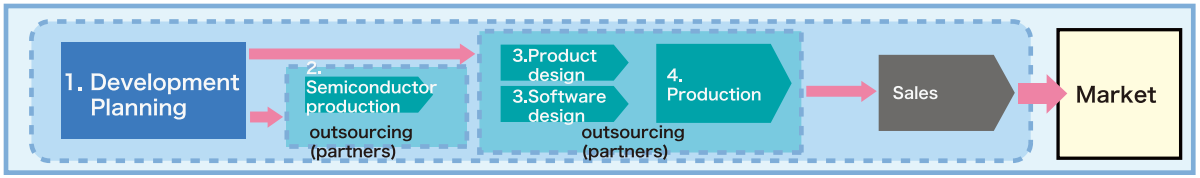




## Revenue Model

● **Digital Act licenses product planning, manufacturing and sales made by its clients.**
Companies are licensed to manufac-ture and sell the licensed products we have planned.




● **License sales**
1. Digital Act licenses internally design products are 2 manufactured by outsourcing (LSI systems) and the 3 products 4 are shipped and sold 5 to the licensed client



# Business Outline / Industrial Property Rights

■ Patents regarding programs and video compression engine based on our algorithm is as follows:

- USA Patent NO. 5,164,819 NO. 5,448,296 (Approved)
- USA Patent NO. 5,739,861 (International patent approved)
  The applicant and developer: John Music

■ For product patents regarding video compression transmission technology, is as follows:

●"Card sized motor-less video camera"
(Special request for grant application number 2000-152642 May 24, 2000) (special open patent publication number 2001-333304 30 Nov 2001)
<Inventor> Kazuhiko Nishi <applicant> Digital Act, Inc.

●"Real time video transmission system with voice mail (voicemail camera tentative name)"
(Special request for delivery on August 1, 2000 application number 2000-232732) (Patent Application Publication No. special opening on February 15, 2002 2002-51327)
<Inventor> Saitou Kazuhisa <applicant> Digital Act, Inc.

●"Disposable digital video camera"
(Special request for grant application number 2000-222466, July 24, 2000) (special open patent publication number 2002-44511, 8 February 2002)
<Inventor> Kazuhiko Nishi <applicant> Digital Act, Inc.

●"Realtime codec DVR"
(Special request for grant application number 2000-234270 on August 2, 2000) (special open patent publication number 2002-51308, 15 February 2002)
<Inventor> Saitou Kazuhisa <applicant> Digital Act, Inc.

● "Recording medium for drive recorder and wherein the drive recorder capabilities," patent pending examination ※
(Special request for grant application number 2001-001683 January 09, 2001)
<Inventor> Saitou Kazuhisa <applicant> Digital Act, Inc.

● "Content Delivery System" patent application
(Special request for grant application number 2000-266608 September 04, 2000) (special open patent publication number 2002-77859 on March 15, 2002)
<Inventor> Saitou Kazuhisa <applicant> Digital Act, Inc.

●"Realtime streaming protocol for video and audio communication system, program and recording medium" patent pending examination ※
(Special request for grant application number 2001-167201 on June 1, 2001)
<Inventor> Mariko Kimoto, Saitou Kazuhisa <applicant> Dejitaruakuto Inc.

● " Image delivery system and system's programing and media functionality" patent pending examination ※
(Special request for grant application number 2001-167201 on June 1, 2001)
<Inventor> Mariko Kimoto, Saitou Kazuhisa <applicant> Digital Act, Inc.

● " Storage medium and image processing methods and apparatus." patent pending examination ※
Special request for grant application number 2001-546146, December 17, 1999) (Patent No. 3,530,844 Patent No. 5 March 2004)
<Inventor> Hiroshi Kozima Tadashi Shigeru Tanaka Yasushi <applicant> Digital Act, Inc.

■ Trademark registration application status is as follows:

●"Company name trademark" ----- -2000-64709 request for trademark registration request for commercial application number (12 June 2000) issue of trademark registration 4490142

● "DAvid" ····· request for request for application for trademark registration number dealer -2000-82793 (July 11, 2000) No. trademark of 4.51415 million

● "FantaPix" ····· request for request for trademark registration trademark application number -2003-113584 (December 9, 2003) issue of trademark registration No. 4779015

● "CAMPHO" ····· request for request for trademark registration trademark application number 2003-071083 (August 5, 2003) issue of trademark registration 4825538

# Business Outline / Risk Factors

### Competition entry

- There may already be a risk of competition from such loss-less image compression formats such as TIFF and JPEG2000. However, with the FantaPix high processing speed without image degradation, there is a clear advantage in using this codec in applications such as camera embedded mobile phones, consumer electronics, outdoor electronic devices, etc..

### Production / Sales / Support

- If the market suddenly expands, there is a risk of a bottleneck with regards to our sales and support department. However, it's this sales and support risk may be reduced by focusing on licensing. However, it is important to work with companies with strong sales forces for special projects such as the sale and marketing of the Campho Advance product.

  *The Campho Advance project was a extra ordinary situation whereby Digital Act took on the role of sales for a product compatible with a partner's. It was Digital Act's initiative to develop this, hence the decision for in-house sales. Digital Act now focuses on increasing its LSI business, as originally planned.

- A risk with outsourcing may be unforeseeable procurement problems of supplies by the partner. To avoid this is it necessary to secure several supply sources at a time. In-house LSI design and design process will also offer further flexibility and reduce any kind of procurement issues which may arise by outsourcing.

# Product Reference Data

# Product Reference Data / FantaPix

Non-degrading loss-less image compression technology
High-quality quantum image restoration technology

**FantaPix®**

Patent 3530844

Presented by Ministry of Economy
Kansai Front Runner Award

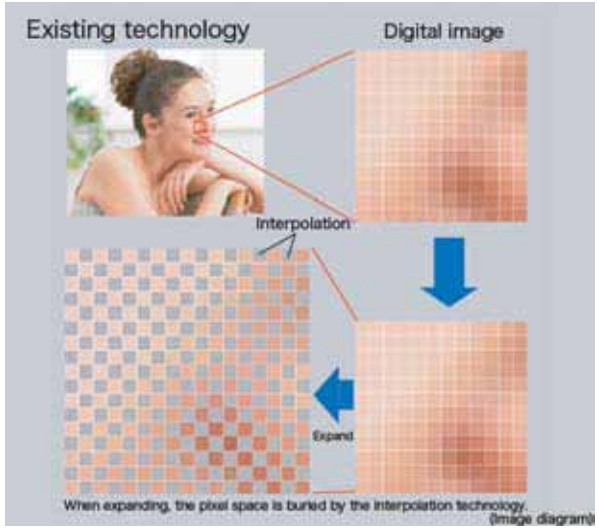
『FantaPix』Technology winner of 1st annual Kansai Front Runner Award (presented by Ministry of Economy, Trade, and Industry)

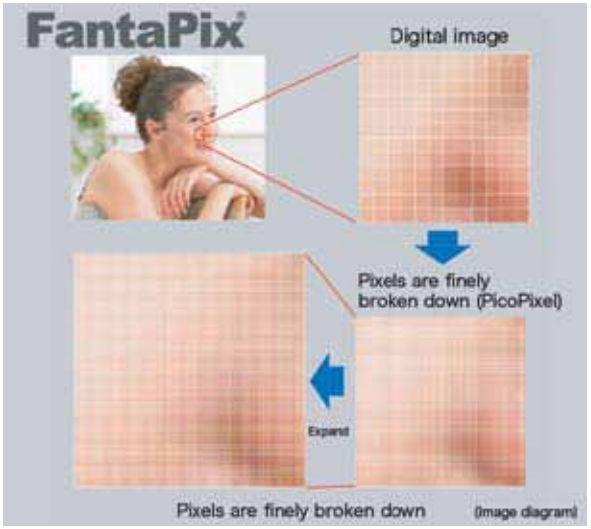
Digital Act specializing in realistic print (analog) output, researched the reproduction of digital ultra-high-resolution imaging that made the best use of optical lens' properties, and succeeded in the development of its proprietary "loss-less compression and high-quality quantum restoration technology" (FantaPix) of which the image does not deteriorate. Patent No.3530844

**FantaPix features the following**
**●PicoPixel enabling technology (high-quality quantum restoration technology)**
**●Non-deteriorating loss-less image compression technology**

**PicoPixel enabling technology**

Current digital images resemble mosaic pictures and are strikingly different from the smooth and mildness of enlarged analog photos where the characteristics of the lens has been made the best use of. "FantaPix" crushes the mosaic into minute pixels which allows for smooth digital images.
Up to now, digital images could not freely be manipulated due to the basis of its mosaic properties. To manipulate the mosaic image freely, and to reproduce beautiful, natural light, Digital Act developed the evolutionary "PicoPixel" technology. This problematic image data processing was thus overcome.
"PicoPixel" making technology is a mosaic destruction technology.

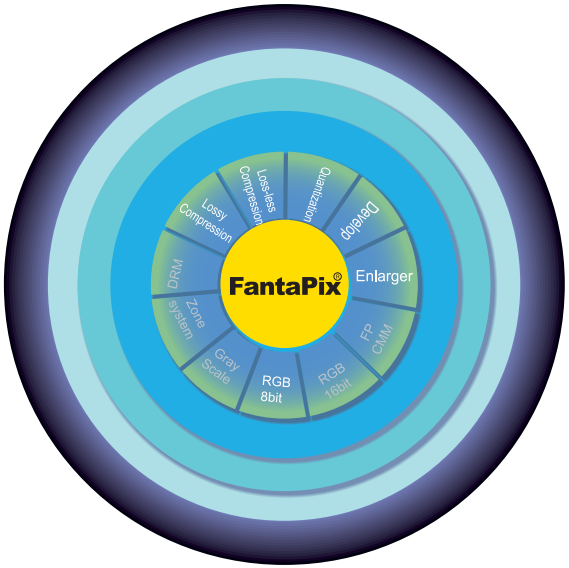


# Product Reference Data / FantaPix 2

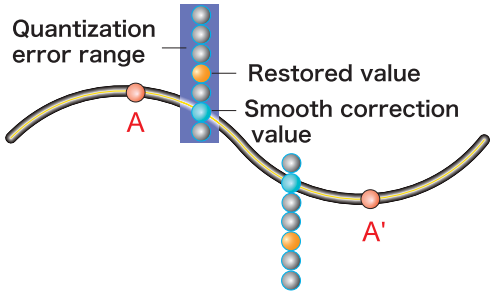
### Non-deteriorating loss-less image compression technology

There are 2 kinds of image compression technologies: “Loss-less compression”, which allows for full restoration of the image’s beauty and its data without degradation. “Lossy compression” (eg. JPEG, etc.) allows for high compression rates (heavy processing required). These are the 2 main compression technologies available.
However, the increasing demand for high quality images available from new digital high res cameras and broadband transmission services, new technologies are required.
Digital Act prides itself in the development of “ultra high-quality/resolution” digital image technology, achieving the same results as analog print output which best utilizes the characteristics of the optical lens.




### Strong technology creates new technology

“FantaPix” is the resulting next generation format when the image is generated with the proprietary "PicoPixel” technology. It’s compact engine and algorithmic quantizing technology restores the image utilizing approximate line algorithms creating ultra high-resolution image quality.




Minute quantization errors are present in low frequency sub-pixels.
In order to reduce the re-quantization error, the main pixels between restored adjoining blocks are smoothly corrected using the loss-less method. This is corrected by estimating brightness curves smoothly in the quantization error range.
And such, compressing block noise, etc. with the loss-less method, the results are revealed.

# Product Reference Data / Product Comparison

| Comparison | JPEG2000 | JPEG | FantaPix |
|---|---|---|---|
| Loss-less | DWT(Dispersal Wavelet Transform) | DPCM | FatanPix data format |
| | possible, but extremely complicated, based largely on lossy technique | no lossy type and compatibility | With quick and simple processing, easily compatible. Loss-less/lossy encoder structurally similar. |
| Lossy | DWT | DCT | FataPix data format |
| | DWT processing is slow. Image quality is significantly compromised. | Based on DCT, thus cannot avoid noise and Pixilation. Fine detail is lost when using high compression rates. | Since compressing low/high frequency, very little influence on image quality. Based on low frequency wave compression, can retain compression rate and edges and diplay them clearly. |
| Loss-less/Lossy compatibility | Common algorithm and data formats are used, but is complicated regardless if lossy or loss-less, processing time is lengthy, high-speed feature is sacrificed. | Algorithm and data format differ, thus difficult to implement. | Loss-less/lossy encoder and decoder are common thus processing time is equal resulting in high speed processing. |
| Compression | Based on DWT | Based on DCT | Huffman encoding used. Others, repertory. |
| Compression algorithm (Quantization/encoding included) | DWT and arithmetic coding | DCT and Huffman coding。 | Quantization is proprietary technology. Huffman encoding. Others, repertoire. |
| Compression rate （Loss-less） | Approximately one half of RAW info is objective, under development | Approximately one half of RAW info is objective, under development | approx. 1/3 size of RAW data. Modification of algorithm data enables compression improvement. |
| Compression rate (Lossy） | Option of 1/10th to 1/100th | Option of 1/10th to 1/100th Up to 1/30th when utility value is left as image. | From 1/10 to 1/100 is possible. (High compression rate for lossy version is proprietary) |
| Processing speed | Slow | Very slow | Fast |
| Re-sampling | Possible with DWT. Depending on the efficiency of the interpolation decoder, the implementation and image quality will vary. | Possible with DCT, but implementation is rare. Image quality does not hold up. | Interpolation of linear alignment to curve spline is public knowledge. Depending on use and other factors, there is a repetoire |
| Re-sampling algorithm | Possible with DWT. Wavelet picture quality when re-sampling. | Possible with DCT algorithm application | Interpolation of linear alignment to curve spline is public knowledge. Depending on use and other factors, there is a repetoire. |
| | Possible to enlarge DWT original image data characteristics, however, practical enlarging uses it several times over. | Enlargement and reduction of size is somewhat possible somewhat, but useful picture quality cannot be attained. | In order to re-sample on the decoder side, the compatibility interpolation algorithm is complete. Enlarge image dozens of times possible with lossy version. |
| Moving image standard | MotionJPEG2000 (JPEG2000 Part3) | Motion JPEG | Motion FantaPix |
| | JPEG2000 enlargment is standard, but implementation is complicated, submarine patent still pending. | Many steps before standard decision is settled | Due to the simple nature of the encoder/ decoder, implementation is easy. Since it is proprietary algorithm, all credibility questions answered through patent. |
| Submission as evidence | As with JPEG, cannot manage recorded image information with lossy | DCT based images cannot be submitted as evidence in Europe and America. Accurate image information theoretically not retained. | The lossy version cannot handle the information which is recorded to the image component, just as with JPEG. However, only loss-less can record the high frequency component. |
| | With loss-less compression, processing time slows down due to utilization of DWT. | Loss-less information retention possible with DPCM, but with the lossy algorithm, there is no data format compatibility | Decoder is same for both lossy and loss-less. Also, depending on the characteristics of the compression algorithm the encode processing time is similar. |
| Patent consideration | Cannot use JPEG2000 standard Part 1 (Core Coding System) patent rights without prior approval from patent right holder Motion JPEG2000 is stipulated in Part3. | In the past, there has been disputes between third party patent rights holders of JPEG encoder/decoders | Technology uses a proprietary file format, which increases patent credibility. Data compression algorithm and encoding system is not accessible through patent right acquisition. |
| Possibility of 3rd party patent implementation | Possibility of the third party who does not approve of JPEG2000 standard Part1 not able to deny. Along with wavelet, there is still question of efficient implementation at the quantitative conversion stage. | It is expected that, based on past experience, disputes amongst multiple technologies within single packages are soon resolved and available in products for the consumer. | With undisclosed repetoire, utilization by third person patent technology possible. Use of third party patent alongside within the rights of the patent, also possible strategy. |

# Product Reference Data / PhotoPicoPixel

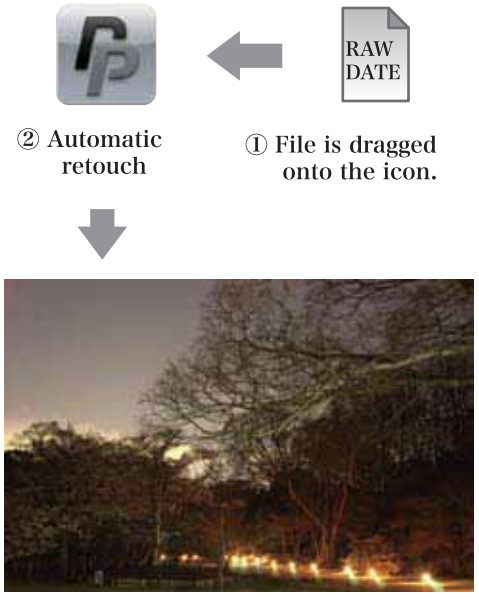
## PhotoPicoPixel™

The FantaPix advanced image processing technology can be easily used as a stand alone application or mixed, depending on the user's requirements with the PhotoPicoPixel series. "Pholook" offers quick control, "Pholarger" offers the ability to increase resolution and blow up the image, and "Phorad" offers RAW data development.

One touch RAW development

### phorad®

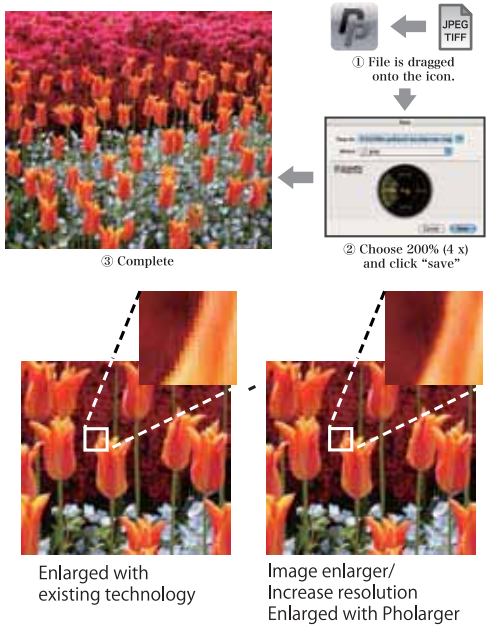
The one-touch RAW development software "Phorad" allows you to automatically develop images optimally, with darker areas darkened, light areas brighter, with rich images as if viewed with the naked eye. Also, "Phorad" supports approximately 140 different RAW formats so that you can enjoy working with images taken from just about any camera.




Enlarge images / Increase resolution

### pholarger®

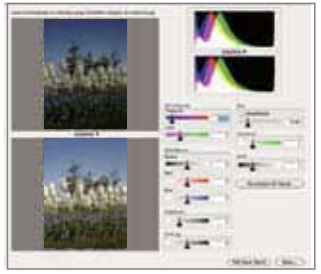
Modify your image size by 50%, 100%, 200%, or 300% (steps may be repeated to reduce by less than 50% or increased by more than 300%) without any compromise in image quality due to block noise or false coloring with the FantaPix “picopixel technology”. It’s simple to use as anyone can enlarge images with film-like quality.




Quick Look Control

### pholook®

Color elements of digital images can be adjusted with seven independent parameters (White Balance、Black Balance、Brightness、Contrast、Blot、Saturation、Level) all in one interface. Also, the image’s histogram can be viewed prior to adjustment and clicking on “Parameter All Reset” restores the image to its original settings.



Pholook control screen (image)

After modification　　Before modification

# Product Reference Data / Campho

## Video Phone Cartridge

A product which uses the existing infrastructure, and interactive video communication application to ensure a low cost operation for the consumer.

CAMPHO ADVANCE
カムフォアドバンス

LICENSED BY **NINTENDO**


- A cartridge for Ninendo's mobile game device (Gameboy Advance) (License agreement with Nintendo)
- Video phone cartridge using existing analog telephone line
- Simple architecture as the Campho Advance (CPA) snaps into the GBA just like a regular game cartridge
- Video is viewed on the GBA screen
- Audio is spoken and heard through the included headset
- No other set up is required, just plug and play!
- Since it uses regular telephone analog signal, no need for additional provider or costs (same cost as telephone use)