Providing Value

A Better Life

Achieving “better living” with continued happiness

Individual

A Better World

Achieving a sustainable society

Society
Providing Value

A Better Life

- Housing
  - Connected Home
  - Zero Emission House
  - Robot Appliances

- Automotive
  - Connected Car
  - Electrification
  - Auto-driving
  - Shared Economy

- IoT/Robotics
  - AI, Sensing, UI/UX

A Better World

- Energy
  - Renewable
  - Zero Emission
  - Local Production & Consumption

- Second battery, Hydrogen

Creating “A Better Life, A Better World” with the Technology 10-Year Vision

- Freedom from Housework
- No Accident
- No Congestion
- Low-carbon Society
- Diversification
- Energy
- Battery, Hydrogen

- Home Energy Solution
- Building/Regional Energy Solution
- Retail Solutions
- Next-gen Logistics
- Automotive energy Solution

https://www.panasonic.com/global/corporate/technology-design/10years-vision.html
IoT/Robotics

10-Year Vision

Freedom from Housework
No Accident
No Congestion
Improve Service Quality
Elimination of Labor Shortage
AI Robotics Home Appliances
Autonomous Driving
Retail Solutions
Next-gen Logistics

Low-carbon Society
Energy Diversification
Clean Car

Energy
Battery, Hydrogen

Automotive energy Solution

IoT/Robotics
AI, Sensing, UI/UX

Technology

Society 5.0: Super Smart Society

Based on material from Japanese Govt. http://www8.cao.go.jp/cstp/society5_0/index.html

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From “Keeping process” to “Customer Value First”

Society 3.0 (Industrial Society)

• Mass production with good quality by defining and obeying processes.
• Focus hardware product innovation

Society 5.0 (Super Smart Society)

• Customer value first, apply the best process for it.
• Innovation of all business models including hardware, software, service, etc.

Direct communication with customers

Waterfall Process:

Unspecified Large Number of Customers

Agile Process:

Specified Large Number of Customers
Restructuring Corporate R&D to promote innovation on April, 2017

Technology & Design Section -> Innovation Promotion Section

Senior Managing Executive Officer
CTO, CMO, CQO, CPO, CIO
Yoshiyuki Miyabe

Business Innovation Division
Advanced Research Division
Manufacturing Technology and Engineering Division
Design Strategy Office

Information Systems Department

Company
R&D/Business

AP Technology Division
Business Development Center

ES Business Development Center

CNS Innovation Center

AIS Technology Division
Business Development Center

Business Digitalization

Business Innovation Division
Wataru Baba
Business Digitalization

Construction of Digital Native Business

Establishment of Panasonic β

Optimization in Innovation Promotion Division

HOMEX - Digital Business Model

A Platform Company  Winning Digital Ecosystem  Software Designed Hardware

HOMEX - Digital Priority

Digital Customer  Digital Products  Digital Supplier  Digital Workforce  Digital Finance

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Software Driven Type Living Space Hardware

Disrupt other industries by digital native business model

Growth through reinventing our industry

Panasonic β
Realization of Mini Horizontal Panasonic and Establishment of Mother Factory for Innovation Mass Production

Horizontal Panasonic about Job Function

Software  Design  AI  Data Science

Panasonic β
Panasonic Cross Value Studio

People  Process  Place

Horizontal Panasonic about Business Division
Panasonic β Involves the whole company
Cross Value Type Regrowth by Horizontal Panasonic about Business Division and Horizontal Panasonic about Job Function

Idea Creation
Prototype
Hardware Prototype
Living Space Prototype

People
Job Function
Company

July
September
November

Restructuring Business Process by Innovation Promotion Division

Panasonic β

Manufacturing Technology and Engineering Division
Business Innovation Division
Advanced Research Division

Show Rapidly Launch Rapidly

Design

Energy

Homex
Panasonic β that leads next 100 years

1. Construction of Digital Native Business
   - Panasonic β
   - Digital Native

2. Regrowth of Mainstream Business
   - Panasonic
   - Digital Transformation

Manufacturing that Embodies the Business Ideas from Rapid Prototyping to Mass Production

Manufacturing Technology and Engineering Division
Tatsuo Ogawa
Show Faster

**Embody the ideas rapidly by prototyping**

Improve the visualized concept by prototype with a feeling of touch

Model made with cardboard etc.  Usable prototypes

---

Manufacturing that realizes rapid prototyping

**Produce the prototype rapidly from data creation**

- CAD data linkage
- High precision scan
- Measure
- Decorate
- Print
- Customized design
- Decorative Printing
- Additive manufacturing
- 3D modeling
Connect to the Business Faster
Produce hundreds units in a short time to examine the business model

- Make a mold with a metal 3D printer
- Reduce L/T significantly
- Prove concept quickly
- Quality of the products is mass pro level

L/T for mold: 1 moths → 1 week

Digitalization of Mass Production
Manage the production instruction optimally for various order & demand change

<table>
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<th>Physical</th>
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Logistics tracking

Verify optimal production instructions

Implement dispatch plan

Supply, plant, storage~logistics

Digitalization of Mass Production
Manage the production instruction optimally for various order & demand change

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Energy Technology 10-Year Vision

IoT/Robotics
AI, Sensing, UI/UX
Energy
Battery, Hydrogen

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No Accident No Congestion
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Energy Diversification

Improving Service Quality
Elimination of Labor Shortage
Retail Solutions Next-gen Logistics

Home Energy Solution
Building/Regional Energy Solution
Clean Car
Automotive energy Solution

Rechargeable battery is key device to reduce fossil fuel

Gasoline-fueled Car
Gasoline Engine
Gasoline Tank

Electric Vehicle
Experimental Electric Vehicle
Motor
Key Device
Rechargeable Battery
Leading Rechargeable Battery Business

- Tesla Gigafactory (Nevada, US)
- Dalian Factory (China)
- Suminoe Factory (Japan)

Advanced Research in Energy Field

Advanced Research Division
Masato Aizawa
Importance of Materials for Battery Performance

Importance of new materials development and analysis of atomic/molecular behavior

Rechargeable battery composition and charge-discharge

Shortening of New Material Development

Solution for drawbacks of a trial and error approach

Materials Informatics
Data-driven Material Search

Structure prediction of functional material by AI

Expt. data
- Battery: Data for 50 years

Reported data
- 50 million data

Simulation data

Material data
- 1 million data

AI

Elaborate Analysis and Evaluation

Analysis of atomic arrangement and behavior

Atomic-scale resolution
Electron microscope

Real-time dynamic analysis ※

Thin-film battery
Thickness 0.1 μm
50 μm

Li behavior in battery material

※ The world’s first tech in positive electrodes (Best presentation award at ICMaSS 2017)
Quick Launch Products into Markets

Close relationship between material search and manufacturing

Rapid Prototyping
Advanced Research
New Materials
New Manufacturing
Production Engineering

Manufacturing Technology and Engineering Division
Tatsuo Ogawa
Pursuit of Security & Safety in Manufacturing

- Monitor physical properties & process points that we could not see before in real time

Knead • Disperse  Coat / Dry  Join • Cut

In-process physical properties / Characteristics sensing

Aim to provide 100% quality with zero defects facilities

Evolution of Traceability by Visualization of Factory

- Aggregate & analyze the all information in factory, reflect decision on production site instantly
  (To Zero Defect from Quality Control)

① Discover & digitize on-site information
- Awareness, MES/Equipment, Inspection log
- Daily report, check
- Sensor data

② Process & store into handleable data
- IoT, Big data, AI
- Select data
- Distributed processing

③ Visualize & analyze process quality in real time
- Trend monitoring
- Visualize the characteristic distribution

Panasonic
Conclusion
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