Abstract

**Purpose:** This study explores the ethical issues that arise in building a community where humans can use smart technology to lead happier lives, a smart society.

**Method:** Technology in a smart society is not unrelated to the human variable, no matter how advanced its level is. As humans pursue value, smart societies also need to be explored from an ethical perspective. This study provides the need for an ethical approach that emphasizes humanity in the process of building and maintaining a smart society. The research was conducted by contents based approach.

**Results:** This research showed that the smart society was clarified by the Fourth Industrial Revolution, and got two characteristics as follows: First, AI, which is the core of smart society in particular, fosters human nature and potentiality through automatic self-realization, human representation, personal and social skills, and social cohesion. Second, smart AI ethical standards include beneficence, non-maleficence, autonomy, justice, and explicable.

**Conclusion:** This paper presented a normative and substantial directions to what preparations should be made for human-centered ethical coexistence in a future-oriented smart society. The ethical virtue or a way of living could be summarized as followed: love for humans, retrospective understanding, variable dialogue, self-sustainability, transparency, explainability.

**Keywords** Smart Society, Ethical Approach, Smart Internet, Industrial Revolution, Smart Technology, Artificial Intelligence

1. Introduction

Human being has pursued a desire for survival. Currently human being has met a converged information society based on ICT(Information and Communications Technology)[1][2][3][4]. Smart society is based on a smart technology which contains IoT(Internet of Things), cloud computing, big data, artificial intelligence, etc. It means that in that society we human being can survive, feel happy, and can deal with whole things through a smart technology. And it is possible to innovate the entire society that consists of industry, economy, administration, and even culture. It could be said a new industrial revolution. A smart society have met the necessity that a smart technology and its values have been devoted to develop a human-centered society[5][6][7][8].

Through the process of the industrial revolution up to now, various needs of mankind have been satisfied. And it was an overall paradigm in the fields of industry, economy, society, academics, and arts due to vigorous scientific and technological development. In particular, the shift has been accelerated by the convergence technology revolution. IoT basically can make
whole objects connect through the Internet. Based on this, mankind can lay the groundwork for realizing the smart society that humanity pursues[7][8].

However, as modern science and technology advances rapidly, humans must quickly adapt to the new environment. In making decision and prosecute the process, humans could not enough time to verify the effectiveness of the technology. In this process, the smart society focused on the satisfaction of human needs. To make linkage between humans and technology, it should be dealt with deliberately in the point of ethical view[8].

In order to pursue a future smart society, humans converge in terms of science and technology. Each part has developed to the independent ethical perspective. So it is necessary to introduce and promote technologies based on the ethics.

Recently, artificial intelligence(AI) is improving its completeness by self-learning based on big data. However, the acceleration of commercialization has caused many social problems. The reason came from that AI has not been constructed on the basis of the ethics. In this ethical foundation, there are two kinds. One ethics is focused on AI itself, another is focused on the human who made AI. In a smart society, human-centered ethics should be prioritized[8].

In particular, human privacy is very severe issues in the cyber physical space. Until now, humans are not connected to each other in cyberspace like the IoT, but in the smart society the connect is unpredictably high level.

Therefore, this paper aims to show the reasonable and practical plan how to prepare for coexistence between AI and real human being.

2. Human Civilization Transition Process and the Advent of AI-Based Smart Society

In the early era of human civilization, human being have got a labor-based agricultural way, steam based, electricity based, and computing/internet based industrial society[7][8], as shown in the following Figure 1.

Figure 1. Industrial revolution’s characteristics: mechanization, mass production, automation, and adaptiveness.

In 1784, the First Industrial Revolution was based on a technological innovation using steam engines which led to consume goods and light mechanized production process. The Second
Industrial Revolution began in the 1870s. During the period, heavy chemicals, such as automation of conveyor belts and internal combustion engines of petroleum power had been implemented by the electrical energy. It brought the vitalization of industry.

The Third Industrial Revolution began in the 1960s. During this period, the main body was digitalization and automation. It comprises electronics, communication, information, and semiconductor technologies, computing, and information industry. They all had been moved by internet.

The biggest problem in the Third Industrial Revolution scenario was “the pursuit of cooperation and community” to maintain employment due to the end of the market and the decline of jobs. The Fourth Industrial Revolution is an extension of the Third Industrial Revolution. The main icon of this era is super-connectivity that connects to the network in whole dimensions. Convergence technology to connect all agents and communities is based on cloud computing, big data, AI which breaks down boundaries[7][8].

Today’s civilized society is not only the extension of the Third Industrial Revolution, which is the core of the information industry. Also the scope and system shows the advent of a marked change of the Fourth Industrial Revolution. Unlike the previous industrial revolutions, it was not linear, but exponentially rapid advance[8]. And it affects most of industries. The breadth and depth of such change could lead to changes in all fields such as services, people, and information. All areas are connected like the IoT to process and store, and time and time. We have created an environment that can be controlled in real time regardless of the places, as shown in the following <Figure 2>.

*Figure 2*. Innovation for mankind oriented fusion and super-connected smart society.

Charles Levy and David Wong talked about “smart society” at Big Innovation 2014. They explained that a smart society leverages the power and the potential of technology to make human beings more productive; to allow us to focus our resources on activities and relationships that matter; and ultimately to improve health, wellbeing and the quality of life. And they said that a smart society could be defined “One that successfully harnesses the potential of digital technology and connected devices and the use of digital networks to improve people’s lives.”[11]. However, this definition goes beyond improving human life. Human factors such as participation and cooperation in the society are neglected.
A smart society is a society that is empowered and generally focuses on the scientific and technological aspects. There is a high probability that humans can be excluded. Therefore, it is necessary to consider future smart society based on human centered ethics. In social systems, the data feedback loop with detection function is an essential element for sustainability.

Future-oriented smart society is a governance city that helps improve the existing information society. The data from the system is integrated into a controllable system with a feedback loop function, it is possible to generate and utilize knowledge to be more successful with feedback control.

Currently, the case where AI algorithm technology based on big data is applied is an autonomous vehicle, drones, translation, investment, and games. This is a vast exponential development of computing power and the availability of vast data.

As mentioned above, the Fourth Industrial Revolution got the physical, spatial, and biologically fusion. As shown in <Figure 3>, a smart society can give challenge and opportunities to human being, at the same time it can give harmfulness also[11].

Smart society is based on the smart technology for everything such as humans, systems, information, and services, i.e. IoT and Big Data. Technology and AI are applied to easily solve difficult social problems. It can bring a happy society in the part of work, economy, economy, industry, administration. It can be said that it is a new revolution that transforms society as a whole, down to culture[11], as shown in the following <Figure 3>.

Figure 3. Core components and smart internet connection for smart society.

The Fourth Industrial Revolution is particularly prone to disrupting the labor market. It can lead to skepticism inequality and increase conflict between machines and humans. But smart factory system adopted to improve production and technologies moved to increase efficiency of management.

In the near future, competent smart humans will play a role as an important element of production. As a result, the wage system changes according to the importance of human roles, and social tensions can be increased. Such an inequality must be regarded as a social concern in the era of the 4th industrial revolution.

Due to the dissemination of digital technology and the dynamics of information sharing represented by social media, human being can get the unsatisfied and use social media platforms to connect and distribute information. In a smart society, this kind of interaction can be served for understanding and cohesion. It offers opportunities, but can create and spread un-
realistic expectations of success. It can also provide an opportunity for extreme ideas and ideologies to spread.

In late 2009, as Apple's iPhone introduced, various new smart devices such as network service, cloud computing, location-based service changed collection-storage-utilization method in the name of Smart Big Bang. Nowadays personal identifiable information such as name, social security number, location information made by CCTV have been exposed. In the smart society, most important thing is to protect private information. Tracking and sharing information is an important part of the new connection, and data control. The inner impact of loss of power will be further discussed in the near future[9][10][13].

The revolution driven by biotechnology and AI needs, through overcoming limitations, to redefine the meaning of humans and ethical boundaries. And it is necessary to introduce AI ethical technology. The direction should focus on the importance of human being.

In thinking of robotization of human, the Fourth Industrial Revolution can deprive the mind and spirit of human being. But it has the potentiality to improve a shared sense of destiny, moral consciousness. That could be duty of mankind. In a future-oriented smart society, if AI cannot be controlled, those who control the AI should be ready to keep the sincere and solid human sensitivity and creativity that AI cannot have.

3. The Role of AI Smart Technology and Ethical Issues

The AI technology of future smart society has received the request such as some ethical principles. AI could not be a kind of new utility, but strong power such as smart agency. AI4People(artificial intelligence for people) should be scheduled to give help to mankind.

AI technologies provide opportunities and opportunities to protect human dignity and grow humans. Opportunities and risks should be moderated through nurturing human nature and potential[9].

- Autonomous self-realization
- Human representation
- Personal and social skill
- Social cohesion: to interact with each other in the world

Human being have got the fear, ignorance, false concerns, or excessive reactions. Because of these, human will not be able to make the most of AI smart technology that can be broadly and fully explained. For example, human can face the excessive or poorly regulated, underinvested, or genetically modified crops. Most of these risks are unintended consequences. It is caused by harm and is usually associated with false will. But we have the wrong incentives, greed, hostile geopolitics, or malicious intentions. The risks associated with abuse or deliberate misuse also need to be considered.

As mentioned above, the social development can get malicious impact by smart AI. Here <Figure 4> summarizes the risk and the opportunity cost of using artificial intelligence.
The working principle of AI is mostly invisible and understood only by high-level experts. Until now, efforts for bioethics have missed the crucial part. So it is necessary to establish ethical standards for smart AI as follows [9][12].

- Beneficence: promoting well-being, preserving dignity, and sustaining the earth
- Non-maleficence: privacy, security, and capability caution
- Autonomy: the power to make decisions
- Justice: promoting prosperity and preserving solidarity
- Explicability: enabling the other principles through intelligibility and accountability

After confirming these principles, it is necessary to construct an AI ethics frame as shown in the following <Figure 5>.

According to Schwab, AI should have the contextual, emotional, inspired, and physical considerations, further more Oosthuizen suggested to contain entrepreneurial, strategic, trans-disciplinary, ecosystem, ethical considerations. <Table 1> follows their suggestions [12].
Table 1. Fourth industrial revolution intelligence framework in smart society.

<table>
<thead>
<tr>
<th>Intelligence type</th>
<th>Key</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contextual intelligence</td>
<td>Mind</td>
<td>How we understand and apply our knowledge</td>
</tr>
<tr>
<td>Emotional intelligence</td>
<td>Heart</td>
<td>How we process and integrate our thoughts and feelings and relate to ourselves and to one another</td>
</tr>
<tr>
<td>Inspired intelligence</td>
<td>Soul</td>
<td>How we use a sense of individual and shared purpose, trust, and other virtues to effect change and act towards the coming good</td>
</tr>
<tr>
<td>Physical intelligence</td>
<td>Body</td>
<td>How we cultivate and maintain our personal health and well-being and that of those around us to be able to apply the energy required for both individual and systems transformation</td>
</tr>
<tr>
<td>Entrepreneurial intelligence</td>
<td>Disposition</td>
<td>How we recognize opportunity through synthesis of the whole and creativity combine resources</td>
</tr>
<tr>
<td>Strategic intelligence</td>
<td>Orientation</td>
<td>How we adapt to changing environments; gather, examine and disseminate intelligence of strategic value</td>
</tr>
<tr>
<td>Transdisciplinary intelligence</td>
<td>Perspective</td>
<td>How we understand a system in relation to its larger environment, relationships and connections, integrating the information from separate disciplines</td>
</tr>
<tr>
<td>Ecosystem intelligence</td>
<td>Coalescence</td>
<td>How we grow and develop within the setting of the system of relationships that form our environmental factors have on us, and how we impact one another and our environment</td>
</tr>
<tr>
<td>Socratic intelligence</td>
<td>Philosophy</td>
<td>How we analyze ideas in terms of their opposites with the objective of creating a more enlightened synthesis</td>
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</table>

4. Conclusion

The present is the return of the past and a stopover to the future. As if there is no present without the past, the future without present couldn’t be thought.

There is no future without. The smart society of the future vaguely approaching is a revolution inside whirlpools. However, through impartial reason based thinking, if human evaluate the current situation well, prepare for it, the smart society never be pessimistic it is feasible.

The smart society of the future should be a human-centered convergence and hyperconnected smart society due to the complexity of science and technology. The preparative efforts for smart society have the following sequence: visioning exercise, priority setting and selection of trends, implementation plan, implementation[14] as shown in the following <Table 2>.

Table 2. How governments can use the future possibilities framework.

<table>
<thead>
<tr>
<th></th>
<th>Step 1: Visioning exercise</th>
<th>Step 2: Priority setting and selection of trends</th>
<th>Step 3: Implementation plan</th>
<th>Step 4: Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tools</strong></td>
<td>Foresight exercises to identify main global trends</td>
<td>Consultations across main government entities</td>
<td>Analysis of selected trends and barriers and enables to leveraging associated future opportunities</td>
<td>Implementation plans</td>
</tr>
<tr>
<td></td>
<td>Research and analysis</td>
<td>Review of Vision</td>
<td>System maps and stakeholder mappings for each trend and the most relevant and</td>
<td>Feedback loops in institutions and process</td>
</tr>
<tr>
<td></td>
<td>Societal conclusions</td>
<td>Analysis of market opportunities</td>
<td></td>
<td>Regular meetings with key stakeholders</td>
</tr>
<tr>
<td></td>
<td>(e.g. townhall meetings) at different levels of government</td>
<td>Analysis of global trends and how they affect the country</td>
<td></td>
<td>Impact metrics to measure progress</td>
</tr>
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</table>
The smart society of the future is expected to move complicatedly due to the convergence of cutting-edge technologies. Some technologies are even ahead of humans. In particular, neuroethics, law, autonomous vehicles, and medicine are showing the tendency etc.[15][16][17].

To prepare for the smart society, this study shows some ethical suggestions. First, the smart society needs a love for humans. Although humans are dignified beings, it is not because they are at next higher ranks under God, but because they are the most imperfect. Because of this reason, humans can sustain their lives by eating relatively large amounts of animals and plants. If so, what would such imperfect beings do with each other? The answer is just to care for each other with pity mind. All human being should have a feeling of compassion.

Second, it needs the retrospective understanding to the original state and convergence of source technology. If ordinary people who are leaving want to make very simple things, eg. paper or pencil, it is not easy to make them without any other person and machine. As human society becomes more complex, this need becomes more and more complex.

Third, it needs the necessity of various dialogues with people in different occupations. In future smart society, AI will do much of the work for humans. When this phenomenon accelerates, the fundamental autonomy of personal thinking would be limited. Therefore, human beings have a variety of conversations with people in different professions.

Fourth, it needs to secure self-sustainability. The smart society has highly dependency to the AI. However, if AI have met emergency situation, human beings will meet the difficulties. It is necessary to secure an alternative ability to solve the problem.

Fourth, it needs to get the transparency. Even secret get the appropriate transparency. Otherwise, in the case of black out of whole process and function of information, whole the smart society can be down to the non-smart ugly society.

Sixth, it needs to get the explainability. Smart society also should be democratic. If the un-explainable dictator get whole information, even he/she can govern well, it would be very dangerous. In the smart society, monopoly for information is the most harmful enemy.

Seventh, it needs to get unlimited responsibility. In agricultural society, no matter how much human do wrong, it will reach at just ruining the farming field in the year. But one fault in a smart society has a great impact. Especially the gateholder must have a great responsibility.
5. References

5.1. Journal articles


5.2. Books


5.3. Conference proceedings


5.4. Additional References


6. Appendix

6.1. Authors contribution
<table>
<thead>
<tr>
<th>Initial name</th>
<th>Contribution</th>
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<tr>
<td>Lead Author</td>
<td>- Set of concepts ☑</td>
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<td></td>
<td>- Design ☑</td>
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<td>- Getting results ☑</td>
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<td>- Analysis ☑</td>
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<td>- Make a significant contribution to collection ☑</td>
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<td>- Play a decisive role in modification ☑</td>
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<td>- Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑</td>
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<td>- Participants in Drafting and Revising Papers ☑</td>
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