

- I am more than delighted and honored to be here,
- First of all, I am grateful to Prof. Kim, who is the president of IACST, and all the members of Intl. Association of Convergence S&T for inviting me and allowing another opportunity to give a keynote presentation.

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- Two years ago, in Tokyo, I gave a presentation titled, "CT in the age of the 4IR".
- My message was that, each IR (Industrial revolution) is characterized with a specific media,

in fact, media defines IR:

- 1IR printed media such as books and newspapers.
- 2IR electronic media such as radio and TV
- 3IR digital media such as web and mobile.
- And for the 4IR, digital media and digital content will be integrated as one, which we can call 'hybrid media'.



- Last year, my subject was HCI, Human-Computer Interaction ... No, ...
- Human-Culture Interaction.
- And proposed 10 questions which are fundamental to the development of digital culture.



- And this year, I want to be more general.
- In the course of my presentation, some part will overlap with my previous presentation.
- Art
 - Of course, art is a subset of culture.
 - Culture is influenced by art.
- Technology
 - Yes, technology influences culture,
 - Culture influences technology,
 - In fact, some people say that tech is culture in the digital age.
- Design
 - Design transforms technology into products and services.
 - When the users interact with products, and use services, user's patterns become culture.
- Democracy
 - I will explain later.
- Let's get started.



- A question: Any one retired?
 - Retirement plan?
 - I wanted to become a photographer after I retire.
 - Until I met this guy.

Yue Minjun.

- He is one of the best-selling, most-famous Chinese painters.



- Many, many years ago, I had an opportunity to collaborate with him.
- One day, after a long discussion, (I've got frustrated.)
- I needed some fresh air, I went out to the downtown for relaxation.
- It was a (relatively) small town in China (meaning its population is only 2 millions;
- and this was what I saw:













- Everyone, almost everyone, holds a big SLR camera.
- Wow!
- Imagine.
- 1 B Chinese people begin to take photographs seriously.
- From the probabilistic point of view, I have absolutely no chance to make a name as a photographer, let alone to make money.
- So, I gave up my dream as a photographer.
- After I retire, I got a new job, and now I work for the government.



-But this experience – China Shock - made me to think about the fundamental structure between contents, media, and platform.

-[click] 1 billion Chinese create contents.

-[click] They upload their photos and videos to the Internet.

-[click] The rest of the world consume the contents on some platform – PC, smart phone, or whatever.

-Literature: Novel (by an author) → Book (by a publisher) → Bookstore/Library/Amazon
-Movies: movie content (by a producer) → Distributer (SONY, ...) → Theaters
-Music: Songs → cassette tapes / digital file → Sony Walkman / iTunes
-Visual art: Painting (by a painter) → Art dealer → Museum / Gallery

-Coming back to the Chinese photographers, who make money? Who become famous? -Any Warhol once said that, in the future, everybody will get famous for 15 minutes. -That's good. But how?

-In the art world, platform is typically gallery or museum.



- I love going museums.
- I go to museum to appreciate the masterpieces.



- I go there to be challenged.



- Museums are like department store.
- You are completely blocked from outside;
- You are supposed to be lost inside,
- (meaning the sense of place is replace by the sense of merchandise)
- Once you are in, you can hardly find a way out
- (both physically and psychologically)



- Like department stores,
- You admire the artwork without fully understand,
 (as much as you admire the Channel handbag without any rationale)



- Like department stores,
- You can find a decent restaurants and shopping places.



- Like department stores, well-known museums are very crowded.



- You can hardly access to the thing.



- Especially on weekends, during the bargain sales, or during the block-buster show.
- And, in Japan, all the time.



- But this has some positive aspect.
- Audience themselves could be interesting pieces of artworks.



- Trying to imitate.



- Audience makes some interesting movement patterns.





- Someone trying to do a very outrageous attempt. [click]



- Each and every artwork has a label. [click]
- Usually, labels play the secondary role, they are meaningless without the artwork itself.



- But sometimes, Labels are more valued than the artwork itself.
- Some people even do not give an eye to the art.



- Museum security guards are also interesting objects.







- They are mostly static, just like art pieces.





Au moment où Denan distallie à partir de ses propres clichés shotographiques le poissage notherus de Cagnes acion une volumentre très cubriste. Picasso diveloppe pour la première fois son travail pictural à partir de ses prises de vue photographiques du village catalan de Horta de Habro.

Derain a également fourné avec son ami Jean Renoir des petits films de tableaux vivants – aujourd'hui mailheureusement disparus – et apparait dans La fille de l'eau (1824). La sélection inédite présentés ici provient du fonds d'atelier du peintre, grâce à l'entremise de Genevière Taillade.

Photographies Photography

Photography is a constant source in Derain's work as a pointer, and many of the paintings are based on photograph. Portures taken by frends during his military service served as a starting point for the large painting is *Bell & Sureanes* and the little composition. *This personnages assistants herebs*, which translates the everyday sight of three soldiers sitting on the grass into a mythic pastoral scene. A number of landscapes of the *Chatou* district were based on postcards, the first being *L*Enterement (c. 1899), a little picture that Mattisse had in his personal collection. Derain's own photograph, which he practised assiduously from around 1909 or 1910 onward, shares the same features as his painting, in an attention to framing and a quest for depth through the play of light and shade that reflect his wish to "shift everything above and beyond the erail". Just as Derain was using photographs of his own in articulating the rocky Cagnes landscape in highly Cubist terms. Picasso made use of the camere for the first time in his painting, with photographs of the Catatian village of Horts der Hebro.

With his friend Jean Renoir, Derain also shot short films of tableau wants - unfortunately now lost - and made an appearance in Reno? a fille de l'aau (1924). The photographs shown here come from the ainter's studio collection, and have been made available thanks to perveive Tallinde.

- Artworks, audience, labels, and guards do not exist independently.
- They are all related one another.



- For example, There is always a tension between the guard and the audience.



- One missing category of objects:
- Museum toilets.
- Each and every museum has its own distinctive characteristics.




- But when it come to the majority of digital art, \ldots
- I don't think museums are the best platform.



- For digital contents, either.

-I am not sure that the existing content-media-platform structure is optimal for digital contents.

-I mean, the museums as the platform doesn't seem right.

-There gotta be a better model.

-This is not just a simple matter.

-It is related to how the rest of the world changes.



- Nowadays, it is granted that we are about to enter the 4IR.
- Klaus Schwab at the Dabos Forum



- One immediate question is ... what is the essenciality of the 4'IR?
- Would it be AI? Big data? IoT? Smart factory? All combined? Or something else?



- There are several ways that we can interpret how those IR have evolved themselves.
- For example, we can reflect the IRs from the Human-Machine Interaction perspective:
- Man-made objects artifacts used to be simple for thousands years.
- During the 1-IR, tools got complicated to become machines.
- The 2IR, machines got more and more sophisticated, and they became our environment.
- As the machine-dominant environments got even more sophisticated, the notion of cybernetics has sprung out. As humans influence the machine, the machine influence humans.
- And recently, or in the near future, machines and humans have got to live happily hereafter.
- 1차 산업혁명: 인간 + 기계(도구) → 환경 변화
- 2차 산업혁명: 기계도 환경의 일부분; Cybernetics (Nobert Wiener)
- 3차 산업혁명: Cyber-space
- 4차 산업혁명: 공존?



- Or you could understand the IRs from the context of energy sources.



- Or from the socio-cultural perspectives;
- 1-IR, as being moving from the classical world to Romanticism,
- 2-IR moving to Modernism
- 3-IR to Post-modernism,
- And so on.



- But here for us, for this presentation,
- Let's take an iconographic approach.
- Meaning picking an image that best represents each IR.





- 1차산업혁명을 대표하는 이미지. (Google image search했을 때 처음 나오는 사진)





- This is a painting by the English painter, William Turner, in the Romantic period.
- A war ship that ruled the Atlantic ocean during the great Victorian era; now completed its mission, sailing against Themes River for retirement, pulled by a tiny steam boat.
- The rumor said that the spectators, including Queen Victoria, shed tears in front of the painting.
- This painting epitomizes/symbolizes the end of the great era, and at the same time, declares the beginning of another great era empowered by the IR.













- For me, It seems that the Italian Futurism expresses the spirit of the 2-IR very well.
- Speed.
- Dynamicity.
- 2D → 3D

<The Arrival>, Christopher Wynne Nevinson (1913)



- Extended space, 3D (X-Y-Z) \rightarrow 4D (X-Y-Z-t)



- Even human exists not in 3D, but in 4D x-y-z-t.

<Unique forms of continuity in space>, Umberto Boccioni (1913)

<The Electricity Fairy>, Raoul Dufy, for Pavilion of Light & Electricity, World Expo (1937)



- But if I am asked to pick just one, I will pick this one.
- <Electric Fairy>
- If you have a chance to travel to Paris, I suggest you to pay a visit to City Museum of Modern Art.
- There, you can find a gigantic wall painting.
- An impressionist painter, Raul Duffy painted this masterpiece for the Paris World EXPO in 1937.
- This painting embraces the completely new world that electricity has brought to our society.



- The painting features 100 scientists and inventors who contributed to the new world.



The 3-IR, (which was initiated around 1970s), is due to computer and digital technology.

Unfortunately, I couldn't find any masterpiece that reflects the computer revolution. But I found one interesting image from the cover of TIME magazine.



- TIME magazine nominates 'Person of the Year' who made the biggest impact on each year.
- And in 1982, it was not human, but computer.
- The subtitle "Computer moves in" suggested that computers were not just an appliance any more, but a family member.



- A more dramatic image came up 25 years later, in 2007.
- It declared YOU us, everyone of us as the person of the year.
- It shows a computer in the background, making sure that this individual empowerment is credited to computers.
- From now on, Everyone can not only access to info, but also express and publish his/her opinion, which is a pre-curser to democracy.



- In fact, we have experienced many occasions like this as the evidence.



- Here is a question for you.
- If the 4-IR is for real, maybe a few years from today, if you were the editor of TIME magazine, who would you place on the front cover?



- In order to answer that, we need to know which direction technology advances.
- We are all technology-savvy, so let me make it very brief.
- In this slide, I have summarized the technology trends in three aspects.
 - 1. Data over algorithm.
 - 2. Digital, once an abstract entity becomes Physical.
 - 3. Network! Human has created networks. Now, the network create us.
- 1. 디지털 파워가 하드웨어 중심에서 소프트웨어 중심으로 옮겨감.
 - 디지털 파워 (하드웨어) Moore's law의 한계
 - 실제 세계에서 일어나는 문제 Complexity가 지수함수를 뛰어넘음. (factorial complexity)
- 2. 디지털화 → 물질화
- 3. 컴퓨터의 네트웍 → 모든 것들의 네트웍



- I can summarize my claim as this:
 - 1IR, 2IR, 3IR.
- The 4IR as the combination data + algorithm/AI + network/cloud → embodied into a physical object.
- When you design some artifact, you are not designing a physical matter, but designing a sophisticated artifact – data + algorithm + network, → physical matter.
- Digital art (and Digital contents) is one such example!
- Automobile, Architecture, Agriculture system.
- Numerous man-made objects, No, almost all artifacts we design
- Will be a hybrid form of {data, algorithm, and network} embedded in a matter.
- 4차산업혁명의 '성장동력 ' 은 'hybrid power'라고 정의할 수 있다.
- 무엇들의 하이브리드?
 - 1,2,3차 산업혁명의 성장동력이었던 물질, 에너지, 정보의 하이브리드.
 - 좀 더 장기적으로는 인간과 기계의 하이브리드,
 - 문화와 기술의 하이브리드.
 - 즉, 많은 문제의 해결책은 인간과 기계의 협동, 문화화 기술의 융합으로 얻어진다!



- So we can consciously conclude that the essence of the 4-IR be hybrid.
- Hybrid of data, algorithm, network + physical object
- Hybrid of Matter, Energy, Information.
- 4차산업혁명의 '성장동력 ' 은 'hybrid power'라고 정의할 수 있다.
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"Hybrid"		
Hybrid Car	Hybrid Computer	
Divergent, Complementary		
← Symbiosis. Synergy—		()
	Best solutions, Best experiences	×

- To make my point clear, the most popular usage of the word would be 'Hybrid car'.
- Hybrid car runs on gasoline and electricity, but not on both at the same time.
- They complement each other.
- You take different but complementary things, and put them together.
- [click] Intend them to create synergy, while maintaining their identities.
- [click] Eventually come up with the best solutions and best experiences.

Hybrid Approaches, Hybrid Phenomenon

- 1. Analog + Digital
- 2. Hardware + Software
- 3. Algorithm + Data

Hybrid approach is not new at all.

We have seen and experienced numerous types of hybrid approach.

- 1. Hybrid between Analog + Digital
- 2. Hardware + Software
- 3. Algorithm + Data
 - This is the way that computer works.
 - Historically, algorithm was superior to data in the research community. If you solve a problem with an algorithm, you would be able to publish, But if you solve a problem using a simple algorithm with a lot of data, you feel shameful.
 - But the situation has turned the other way around because computing has become so cheap.



- 4. Physical + Cyber
 - Physical 세계와 Cyber세계의 하이브리드는 4차산업혁명의 핵심으로 인식되고 있음.

Hybrid Approaches, Hybrid Phenomenon

- 1. Analog + Digital
- 2. Hardware + Software
- 3. Algorithm + Data
- 4. Real + Virtual
- 5. Culture + Technology





- Hybrid of human and machine
- Human and machine complement each other, help each other, and co-exist.
- But there is a danger that numerous SF fictions and movies have illustrated.


- If this trends accelerate itself, in the near future, we might see an image at the newsstand as this.
- Person of the year, They!
- Who are they? Well, They refer to machines; Super intelligent robots and super powerful computer servers.
- The real problem is that these machines are not as intelligent as humans are.



- There will be three categories of people:
 - Blue category Small number of selected people who own the machines.
 - Green, desirable category Those who make their living by doing what machines cannot do. They make a good living and live like real people.
 - Red category Majority of people who must do what machines do not want to do. They will suffer from low income.



- The first scenario: long-tail model.
- The problem with this scenario is that the portion of the green category the most desirable class of people may be way too small, if we don't take actions.
- Aldus Huxley, Brave New World. Alpha class, beta class, epsilon class.
- If this is the case, the income distribution should look like this:
- Just like 200 years ago, at the peak of the 1-st IR, most of us will be poor, and only a small number of chosen will be super-rich.



- But there could be an alternative scenario in which the majority of people belong to the green category; making their living by doing what machines cannot do.



- The role of government is to build and operate two fences (or dams)
 - Welfare fence it will protect people from falling to the red category.
 - Regulation fence it will discourage the blue category from extending too far to the right.
- So all in all, the distribution doesn't move too far to the left side,
- and at the same time, doesn't spread too much to the far right,
- thereby maintaining a Gaussian distribution



- The role of technology is three folded:
- 1. Red arrow (public role): reduce air pollution, CO2 reduction, global warming, affordable technology, ...
- 2. Blue arrow (public role): public-domain SW/tech, Living lab, ...
- 3. Green arrow (industry role): shifting the entire distribution to the right side, by contributing to the industrial innovation.



- The role of design is three folded:
- 1. Green arrow (industry role): traditional design practices; industrial design, visual design, interface design
- 2. Red arrow (public role): universal design, affordable design, environmental design, green design
- 3. Blue arrow (public role): meta-design design that makes general public participate the act of designing. Living Lab.

Role of Art

- Role of Art?
- Art is not meant to be purposeful.
- It will be nice if art motivates design and technology to act right.

IRs vs. Testbed 1'st Mechanical Rev. Factories • Industrial Complex 2'nd Electric Rev. Wars • Technology Park 3'rd Digital Rev. Capitalism • Silicon Valley 4'th Hybrid Rev. (Cultural) Democracy • Smart Urbanity

- What will be the social implication of this?
- When you create, design, invent, develop some thing, you need to verify that it works as was intended.
- Smart urbanity
 - by anyone, in any where, at any time.

