Intellectual Capital for Communities In the Knowledge Economy

United Nations Educational, Scientific and Cultural Organization

Information for All Programme

CONFERENCE REPORT

The World Conference on Intellectual Capital for Communities
14th Edition

Safe and Ethical Cyberspace, Digital Assets and Risk:

How to assess the intangible impacts of A growing phenomenon?

Organised by
The European Chair on Intellectual Capital, the University Paris-Sud
And UNESCO's Intergovernmental Information for All programme (IFAP)

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With a Regional Focus:
FRANCE

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BETTER POLICIES FOR BETTER LIVES

PRESENTATION

The central theme of the 14th Edition of the World Intellectual Capital (IC) Conference is **"Cybersecurity, digital assets and risk: *How to assess the intangible impacts of a major hidden phenomenon?*"** Many countries, firms and organisations are now concerned and challenged by cyberattacks, a phenomenon which is often hidden, but for which we are still lacking analytical tools as well as extensive data, even though several regulations have been put in place for these events reporting , especially in US. The first law on cyber-attacks, in the form of data breach notification law, *California S.B. 1386* bill, was passed in 2002. Since 2002, many other states adopted similar laws. A security breach notification law requires any organization which has been subject to a data breach to inform customers and other parties. Academic studies related to the impact of data breach on economy started almost at the same time. The first studies have been mainly analysing this effect through changes observed in stock exchange markets. Later works studied the impact of data breaches on firm reputation. With the advent of cyber-attack databases such as datalossdb.org, Privacy Rights Clearinghouse, etc. new studies using higher number of incidents have been published. Nearly all research has been carried out on the analysis of the changes in stock market prices in the timeframe of the cyber-attack incidents. Few have analysed this change through social media data. The convergent conclusion of such studies is that there is a negative return for a limited period of time for most of the firms which are subject to a cyber-attack.
The intangible impact of cyberattacks is also the main focus of the European project Hermeneut, which supports this conference [1].

The meso/macroeconomic effects of cyber-attacks

In recent years, the macroeconomic impact evaluation of disruptions of different types have been explored by academic researchers with a growing interest in the subject, for policy perspectives notably. These research papers include disaster risk management for terrorism risk management and for natural disasters impact, supply chains networks, energy disruptions), etc.

The growing importance of digital in the economic system and the increasing dependence of other economic sectors on the IT one, make the IT sector one of the most important sectors nowadays. This led government officials to classify the latter as a *critical infrastructure sector*.
Given its relatively high importance, the IT sector is subject to a number of cyber-attacks of different types and with different aims and strategies. These include industrial spying, but also data breach, all of which aim to destroy or lower a firm's profit, or to make profit out of these data breaches, from the attackers' perspectives. This has led governments to include cybersecurity in their national defence strategies, hence reinforcing the cybersecurity level of public and private firms. This is usually done by imposing a number of security checks and constraints at the firm side. However, despite numerous legislations and rules imposed by countries and regions via their national agencies dedicated to fighting against cyber-attacks and vulnerabilities, there is an observed growing number of sophisticated cyber-attacks, which makes IT important, in both the microeconomic and macroeconomic perspectives, to assess their impacts. The evaluation of the macroeconomic effects of cyber-attacks helps estimate the relative importance of cybersecurity on economic activity and manage risks accordingly, with the help of economic models on growth.

[1] https://www.hermeneut.eu. The project is scientifically coordinated by Ahmed Bounfour

Due to the importance of cybersecurity in economic activity, literature on this subject is getting copious with the use of state-of-the-art (economic/econometric) modelling strategies. However, the nature and length of cyber-attacks often make it difficult to assess these meso/macroeconomic impacts. However, even with short lasting cyber-attacks, significant meso and/or macroeconomic effects may occur, due on the one hand to the interdependencies between firms, and on the other hand to interdependencies within and between economic sectors. Such interdependencies are usually modelled using a model that originates from Leontief (1986) *Input-Output Model (I-O)* in which it is argued that there are interdependencies between sectors in the economy such that some industry outputs constitute intermediary goods or inputs to other industries. We implemented such an approach, in a dynamic perspective (DIIM).

The intangible impact on firms and organisations

As the knowledge economy has developed, the contribution of intangible assets in the process of value creation is now evident to analysts and stakeholders. Yet, the relevance of accounting data for assessing the value created by firms is still very weak, due to the reluctance of accounting standards to take into account seriously intangibles as assets, especially those internally generated.

Business modelling of the attackers

The essence of a business model is how the enterprise delivers value to customers and their ecosystems. In general, the valuable item in a cyber-attack incident is the stolen data which are then delivered on the dark market and usually paid with cryptocurrency. In the context of defining attackers' business plans, we aim to also evaluate cyber-attack risks in relation to attack types. To do so, we develop a model that characterizes the different types of attacks based on firms' personal characteristics. For this purpose, we propose the following ordered probit model.

Analysing systemic risks

Cyber Risks need to be assessed, measured and addressed reliably. There is then a need to develop frameworks for risk assessment as well as educational tools for dissemination among firms, government bodies and communities.
This year, following the success of IC8 (South Korea), IC9 (the Mediterranean), IC10 (Brazil), IC11 (China), Africa (IC12), Japan (IC13), we focus on a country with several ongoing projects on intangibles: France.
As at former IC conferences, these questions are addressed at various levels: countries, regions and territories, cities, firms and networks.

We will also address some of the recurrent topics of the IC conferences series, such as innovation policy, information sharing, knowledge transfer, measurement, valuation and reporting, as well as the next research and policy agenda for intangibles and intellectual capital.

Welcome address

The Conference was opened on behalf of UNESCO by **Dr. Boyan Radoykov**, who welcomed the participants and pointed out the relevance of this year's subject for enterprises, individuals and societies. UNESCO has put a great importance on the subject related to cybersecurity under three different points: *dangerousness* through the multiplication of actors and techniques relative to cyber-attacks; *nesting* of cybercrime issues; and *exposure* of societies to cyber-threats which are the results of digitization and the large-scale use of smart objects.

In her welcoming address**, Chafica Haddad**, Chair of the UNECO Information for All Programme (IFAP) insisted on the fact that the subject of the IC14 conference interested both UNESCO and IFAP as the internet nowadays represents the main medium of exchange of citizens all over the world, and for youth. At the same time, the internet is a place of terrorism which must be fought. In this respect, UNESCO and IFAP has put great efforts in taking several initiatives and there are a number of conferences that have been organized related to the subjects. Such initiatives which were presented in the session dedicated to digital transformation, ethical cyberspace and the policy agenda.

Professor **Alain Sarfati**, Vice-president of Paris-Sud University, insisted on the fact the subjects covered by the IC14 conference were particularly timely. Talking about Artificial Intelligence (AI), he insisted on the fact that it is going to be everywhere. However, given its high technology use and innovativeness, AI may be used for the good as well as for the bad. Thus, there is a need on investigating the bad.

Professor **Ahmed Bounfour** closed the welcome address by underlining the relevance of the subjects of IC14 in the context of "information for all", and on the focus which is France. He also invited participants to discuss into details the key points of the agenda of IC14.

Session 1- Digital transformation, ethical cyberspace and the Policy agenda

Moderator

- **Boyan Radoykov,** UNESCO

Speakers

- **Chafica Haddad,** IFAP
- **Dominique Guellec,** OECD
- **Marten Kaevats**, Republic of Estonia Government Office
- **Guillaume Poupard,** ANSSI
- **Jakub Boratynski**, DG Connect

The session on Digital transformation, ethical cyberspace and the policy agenda was moderated by **Dr. Boyan Radoykov**.

In her address, **Chafica Haddad**, the Chair of UNESCO's Intergovernmental Information for All Programme (IFAP), insisted on the number of conferences that have been organized in partnership with UNESCO and IFAP on the subject related to the topics covered by the IC14 conference. She insisted on the fact that the internet is nowadays the medium of exchange, and at the same time, a place for terrorism. On this line, she discussed the initiatives undertaken within the IFAP that identifies six areas related to the cyberspace. In this respect, IFAP organized in 2017 a reflexion space on the Darknet, while recognising that the darknet also has a potential positive use such as the protection of journalists and data protection. She also highlighted the importance of young people as being key actors in the process of reducing radicalization which is the main priority of both UNESCO and IFAP. In this

respect, in 2016, a conference organized by IFAP was held in Quebec City and covered the subjects related to the internet and the radicalization of youth in terms of prevention. Other important steps for UNESCO and IFAP were the organization of a conference in Beirut on May 2017 about violent extremism. Chafica Haddad closed her speech by arguing that IFAP defends the position that free flow of information always should be the norm.

Guillaume Poupard, Director General of ANSSI, in his speech "How a Government addresses the Issue of Cyber Risks", shared the experience of ANSSI in the subject. Insisting on the missions of ANSSI which is a governmental agency that totally focuses on the protection of the different victims of data breach in France (French State, consumers, enterprises, and the French economy in general), he argued that the offensive area is totally disconnected from the defensive one. In addition, he deeply insisted on the fact that the level of cyber threats is underestimated and out of reality. "Victims are ashamed of being victims". In addition, according to him, 80% of serious attacks aim at stealing information and all data types have value, no matter whether they are personal or not. Data are the core business of the attackers and data don't need to be directly constructed (digital raw material). In terms of the impacts of cyber-attacks on the physical world, they may be very fast (example of attacks in the energy sector) and for firms, measuring such impacts is a complicated task. Therefore, the observation is very dark, insisted Guillaume Poupard. The future will also be naturally dark because of the creation of higher attacks surface because of the continuous digitization of societies. Examples are the autonomous vehicles which are going to be a major target, the smart objects, tools of the healthcare sector, etc. Thus, the challenge is to ensure cybersecurity of the ecosystem created by smart cities, for instance. In France and in Europe in general, in 2013, the rules on the critical infrastructure sectors were introduced and the NIS directive was released. The main issue is the systemic effect of attacks that are such that, even though a SME is attacked, it can create problems in the whole ecosystem. A major issue is, according to him, the estimation of the impact of attacks on the e-reputation of firms, for instance. He concluded his speech by questioning the audience on the observation that given 95% of the cyberspace is the Darknet and the Deep web, what should we do with these numbers? This is an open question that needs to be addressed.

In his presentation entitled "Digital Agenda and Innovation Policy", **Dominique Guellec,** Head of Division, Directorate for Science, Technology and Innovation at the OECD, started by recognising the importance of the IC conference that he qualifies as the "DAVOS" of intellectual capital. Questioning the specificities of digital innovation and their interest for economic policy, he insisted on the observation that innovation and digitalisation are everywhere. Digital innovation is, according to him, underpinned by new technologies that include artificial intelligence, smart phones, big data, the internet of things, 3D printing, the block chain, and virtual/augmented reality. In such a context, the new driver of growth is based on a broader and more efficient use of data processing technologies. Changes in the micro foundations of the economy

due to digitalization lead to zero marginal cost of data handling (re-production, communication, etc.), lower fixed cost and data fluidity. As digitalisation is about making information handled by machines, there are technical changes that operate with gains in terms of productivity. Activities that benefit massively from digitalisation are R&D and innovation which are intensive in information. Digital innovation is different from traditional innovation for four reasons. First, data is the main factor of innovation. In fact, data is the new oil of the digital economy because it is, as a raw material, the major source of innovation and value creation. Hence, data access is a unique competitive factor as companies want to acquire data, to invest on data collection and to keep their own data proprietary. The second reason is servitization. Servitization comes from the fact that data and software are substituting to physical products and bring new services. Manufacturing firms for example are being more and more attracted by the "3S" concept: sensors, software, service. Conversely, service firms are more and more entering the manufacturing sector (e.g. the autonomous cars). A special category is service innovation where there are new business models such as the sharing economy where, for instance, renting replaces selling. The third reason is the acceleration of innovation in which, for instance, digital products can reach instantaneously their entire market. The last reason is the increase in collaboration induced by digital innovation. Insisting on the business dynamics and market structures, he argued that digitalization lowers entry barriers to markets and hence leads to more intense competition on markets. It also facilitates size and monopoly and lead to a "Winner take all market structure". Performance and rewards related to innovation are distributed through data fluidity, rigidity of skills and competences, data complementarity and data abundance. Therefore, the distribution of performance and rewards is becoming more skewed. In terms of policies, there is a need of an update of the targets, the mechanisms and the instruments of innovation policies. There is a need for policy experiments and evaluation as many of the issues raised are new, and learning is needed before strong policy measures are taken. In addition, there needs to be a development of an open data policy agenda because data have many properties of a public good. The policy objective is thus to ensure the broadest access to data and knowledge, while respecting constraints in relation with the diversity of data, ethics and economics with incentives to produce and disseminate the data. Concluding on this last point, his view as an economist is that, given that marginal cost of sharing is zero, why not sharing? However, to share, there needs to be production. Consequently, the questions are: who produces and what about production costs (IP rights, etc.)?

Marten Kaevats from the Republic of Estonia Government Office, in his speech, tried to point out the positive point of view of the cyberspace by presenting the Estonian case. He started by arguing that cyber helps people to build the digital society. This, according to him, has to do with culture and mind-set of people reading it. The government of Estonia is building, since 2001, an "invisible government", with the observation that the aim of the government is not to punish, but to help and cybersecurity is a key component in this building process. There are two critical strategies adopted by the Estonian government: (mandatory) digital identity with secured authentication, and how to use it safely and properly. The Estonian *Once Only Policy* ensures that once information is asked by the government and the

municipality, it is not asked again. There are no copies stored. The data is stored where it is generated, and the traffic agent does not know all personal information of the user (citizen). The only information the traffic agent can access is whether the citizen has a driver licence or is a vehicle owner. The population agent knows the birth day. In such a government, everything can be done directly on the internet in Estonia except getting married and real estate activities. On the cybersecurity aspect, Estonia has started to investigate the block chain to maintain data integrity in the ecosystem. He concluded his speech with the remark that to make all these things happen, there needs to be a cultural change, and not necessarily a technological change. However, it takes time for such cultural changes to happen.

Mr Ferrara from the DG Connect and the European Commission presented a "Digital agenda for cyber risks" announcing the launch of a set of initiatives aiming at:

- ❑ Building EU resilience to cyber attacks
- ❑ Creating effective EU cyber deterrence
- ❑ Strengthening international cooperation

Session 2 – Keynote Speech

Moderator

- **Boyan Radoykov,** UNESCO

Speaker

- ***Indrajit Banerjee**, Director at UNESCO*

In his keynote speech, after thanking Pr. Bounfour, IFAP and the conference organizers for choosing such an important topic for this year's conference, Dr **Indrajit Banerjee** insisted on the fact that people have, for a long time, tried to ignore, sometimes intentionally, the risks that cyberspace raises for us. He emphasised the need to identify the responsible, citing the example of Cambridge Analytical which, despite the recognition of the problem and the huge amount of data that were stolen, did not arrive at a solution to the problem. Insisting on the question of accountability, he stressed the Bluewin game which is a game that was launched in the cyberspace. A common element

between people playing that game and who were being investigated by the Indian police is that they did not choose to play the Bluewin game but were selected based on their behaviour on the internet. The question of who is accountable is also raised in that example. Jurisdiction is also, according to Dr Banerjee, one of the questions related to cyberspace, especially when it comes to child traffic activities which have been delocalized online. This was one of the questions raised during the conference organized on juvenile justice, organised by UNESCO earlier this year. There are thus a number of challenges that need to be addressed, but the biggest one is about building a consensus around an issue which affects everyone. Jurisdiction issues are complex, and UNESCO is working on building inclusive knowledge societies with two main aims: how to maximize the use of all the existing tools such as online platforms, and how to prepare future generations about the risks associated with such use. In this framework, he presented the different existing programs and tools developed by UNESCO. These include the launch of the Internet Universality Framework with its four underlying principles which are known as the ROAM principles: human-**R**ights based, **O**pen, **A**ccessible internet governed by **M**ulti-stakeholder participation. According to him, access is the new issue, no more connectivity. He also presented an extensive program on multilinguism in cyberspace, while insisting on the role of languages on the whole process of internet access. He concluded his talk by citing three existing issues related to internet access: lack of local language content, lack of irrelevant local content, and lack of content which could enhance the livelihoods of people. These are a number of complex questions UNESCO is addressing and investigating with its existing resources.

Session 3a - Modelling and Valuing the Intangible Impacts of cyber Risks

Moderator

- **Stefan Gueldenberg,** niversity of Liechtenstein

Speakers

- **Leigh Wolfrom**, OECD
- **Philippe Cotelle**, Airbus
- **Laurent Peliks**, EY

The session on modelling and valuing intangible impacts of cyber risks was moderated by **Stefan Gueldenberg**, University of Liechtenstein

The presentation of **Leigh Wolfrom** "The emerging Insurance Market for cyber risks", OECD, was about the work of the OECD on cyber insurance who has been working on the subject since 2016 with two reports that were published in May 2017 and November 2017. The first report studies the market for cyber insurance, while identifying policy measures that would potentially address some of the main challenges to its development. The second report examines the type and magnitude of losses incurred from cyber incidents, while studying the insurance coverage available for cyber-related losses and identifying challenges to the development of the cyber insurance market with the initiatives to address such challenges. According to these studies, cyber insurance provides coverage for several common cyber incidents that include privacy breach, Denial-of-service (DoS), cyber-fraud and cyber-extortion. It is a carve-out of coverage from many types of traditional policies. The cyber-insurance market is growing extremely quickly with a size of USD 2.5 billion but remains extremely small relative to other businesses (USD 277 billion for the Property business) and with low levels of take-up. For instance, 30% is the share of companies hold a cyber insurance in Germany compared to 36% in the UK and 55% in the US, and compared to other commercial lines. The challenges for insurance companies are threefold: quantifiability of the risks levels, risk accumulation and confusion about coverage. The first challenge - quantifiability - is linked with the fact that incident data is recent, and there are few extreme events in the tail, while the nature of cyber risk is continuously evolving. Concluding about intangible risks and their coverage (for reputational damage, intellectual property theft and data), companies should, according to him, be able to objectively value and/or quantify such assets before covering the risks associated with them (coverage for reputational damage, intellectual property theft and data).

In his presentation "How do large firms consider the intangible risk", **Philippe Cotelle** insisted on the fact that intangible assets are difficult to value, compared to tangible assets that are also insurable. Intangible assets are, unlike tangible ones, on thin and inefficient secondary markets. In addition, they are difficult to insure. However, there has been a positive evolution from 1995 up to now on intangibles valuation, especially given that they represent about five times the value of tangibles in a company. The full year research program joint with the IRT-SystemX with partners that include Airbus, the OECD and Groupama has engaged continuous dialogue among all parties. Intangible value is also related to the value of data that generates growth. There is also a value creation process thanks to smart connected products. Smart products and data analytics both generate new offers, and these are the reasons why digitalisation is and will remain the engine of future growth. All these are related to the value of intangibles, valuation of which can be addressed with the help of accounting rules. However, such rules need to be different as the current ones remove most of the intangible assets from the balance sheet. These include registered trademarks and customer data that are generated internally, and human capital. The 2004/48/EC directive of the European parliament and of the council and related to the enforcement of intellectual property rights was released in 2004, and

European directives can thus support financial valuation of IPRs. About cyber risk and the insurance market, there is a lack of reliable actuarial analysis on this line, and the use of models for cyber insurance risk is not prevalent and tested. Current models that are being used adopt the rating approach used for natural disasters and terrorism exposure. A main proposal of the consortium is to put in place a cyber risk governance group whose mission is to determine cyber risk exposures in financial terms and design possible mitigation plans. Such a group needs to be cross-disciplinary and their recommendations are in line with the increase of companies' maturity on corporate cyber risk governance and their exposure to optimize necessary investment and insurance strategy. They also recommend proposing a framework on external communication of companies on cyber risk and their exposure, to clarify board members' responsibility and liability related to cyber risk, to propose international norms on financial evaluation of the impact on intangibles assets, and to develop insurance solutions on intangible assets coverage. He concluded his talk by arguing that communication on cyber insurance shall be structured and rationalized, and there needs to be a development of access to data for setting cyber risk modelling and for clarifying risk accumulation to allow the insurance market to become the real engine of insurance market expansion.

Laurent Peliks from EY gave a talk on "How to develop strategies for facing cyber risks". He started by presenting the cyber risk landscape and their new challenges and issues. In particular, storing data on cloud and outsourcing to an external provider is becoming more and more common. The issues are associated with making sure that security requirements are implemented on externalized services, and to be able to understand the report from third parties. Another challenge is linked to critical infrastructure protection for which one of the issues is to map the company risks and implement measures primarily for sensitive systems. The collaborative technologies/social media are also being more and more used as collaborative communication systems. However, companies need to make employees aware of the limit between personal and professional lives on social media and manage efficiently the risks to brand reputation. In addition, he observed that only 4% of organizations are confident that they have fully considered the information security implications of their current strategy, and that their risk landscape incorporates and monitors cyber threats vulnerabilities and risks. Inputs to consider in the process of developing cyber strategy include previous cyber strategy/IT security audits, benchmarks, requirements constraints and organization. According to him, understanding its ecosystem and maturity level is key, in particular identifying high value assets and critical information, qualifying cyber threat exposure, identify cyber-attack tactics and define the adapted cybersecurity response plan.

Session 3b - Modelling and Valuing the Intangible Impacts of cyber Risks

Moderator

- **Helena Tenório Veiga de Almeida**, Brazilian Development Bank (BNDES)

Speakers

- **Ahmed Bounfour**, **Altay Ozaygen, Rokhaya Dieye**, and **Niaz Kammoun** , University Paris Sud
- **Alexander Szanto**, Brandenburg Institute for Society and Security (BIGS)

The second session on modelling and valuing the intangible impacts of cyber risks dedicated to the presentation of Micro & macro impacts of cyber risks: Interim results of H2020 HERMENEUT project was moderated by **Helena Tenorio de Almeida** from BNDES.

Ahmed Bounfour and his team of postdoctoral researchers **Altay Ozaygen**, **Rokhaya Dieye and Niaz Kammoun** from University Paris-Sud presented their results from the Hermeneut project financed by the European Commission in his H2020 Framework Programme. Starting with the observation that the growing importance of cyber-security in knowledge-based economies has generated concerns about the risks of data integrity, data confidentiality and data accessibility, he observed that, given that in knowledge-based economies, intangible assets represent on average 80% of companies' total assets, firms' intangibles may have a high probability of being harmed by cyber-attacks. However, the economic loss of a cyber-security event is

difficult to measure when the loss is mainly related to these intangibles. The Hermeneut project on cyber-security led by the University of Paris-Sud within the European Chair on intangibles and funded by the European Commission within the H2020 program, attempts to quantify the tangible and intangible losses generated by cyber-attacks. The high sophistication level of cyber-attacks complexifies their global costs estimation. By combining an event study approach, a Natural Language Programming and counterfactual analysis, the team found that macro level lead to cascading effects of cyber-attacks resulting from sector inoperability generated by such attacks. In the US in 2013, total direct economic losses would amount up to USD **$145.5 billion** for a single attack that initially generates 20% production dysfunction and would last 180 days. The associated direct losses on the ICT sector amount almost **15%** of the total economic losses. In addition to these results, the team found that the main economic factors driving cybercrime are the attractiveness of the target and the economic conditions that the offender faces. Target attractiveness depends on how the offender perceives the target. Another result is that there is an increasing probability that the attack is committed by an organization using various attack types associated with R&D expenditure. On the other hand, the probability of a privacy violation does not change as the firm's' R&D expenditure increases. The predicted of probability of a cyber-attack made by an organization decreases as the firm's selling and general administration expenditure, a proxy for the category of intangible organizational capital, increases. Results show that the preferred attack type of organizations is phishing and ID theft.

Alexander Szanto from Brandenburg Institute for Society and Security (BIGS) presented four sector-specific case studies of cyber-attacks from IP-intensive industry, financial services, digital retail platforms and healthcare. These cases were also highlighted in the Hermeneut project. Each case is about a firm in the respective industry and presents what had happened, why this is a good case and the consequences of the cyberattacks on the firm. In the lessons learned from the four cases, Mr.Szanto summarized that there are two types of attackes, those targeted at a specific firm and others which are distributed which are looking to affect a wide range of domains and users by phishing mails and other malware as well as DoS and DDoS attacks. In terms of the attack strategies, he emphasized that approximately 97% of successful attacks involve some degree of social engineering and that the human factor plays a significant role – either by human error, malicious intent or incompetence. Another aspect are the attack related costs which can manifest beyond monetary effects to those relating to reputational damage. He closed is presentation with a list of factors influencing the impact on reputation.

Session 4 - Intellectual Capital of France: Recent Developments

Moderator

- **Dominique Guellec**, OECD

Speakers

- **Rémy Lallement,** France Stratégie
- **Didier Patry**, France Brevets
- **Frédéric Caillaud**, INPI
- **André Gorius**, Solvay & LES France

The session on intellectual capital of France/ recent developments was moderated by **Dominique Guellec**, OECD.

The presentation of **Rémi Lallement** from France Stratégie was about the quantification of the investment of France on intangibles. There were many questions related to the subject that the presentator tried to answer. The first question is whether France invests appropriately in intangibles? And does the level of intangibles investment explain the relatively poor performance of France in terms of international competitiveness. Data show France in an international ranking of intangibles investment, including rankings on IPRs. There are two categories of intangibles identified: intangible assets according to national accounts that are only partly treated as investments (R&D, mineral exploration, computer software, etc.) and intangible assets that are grouped into three categories according to the Corrado, Hulten and

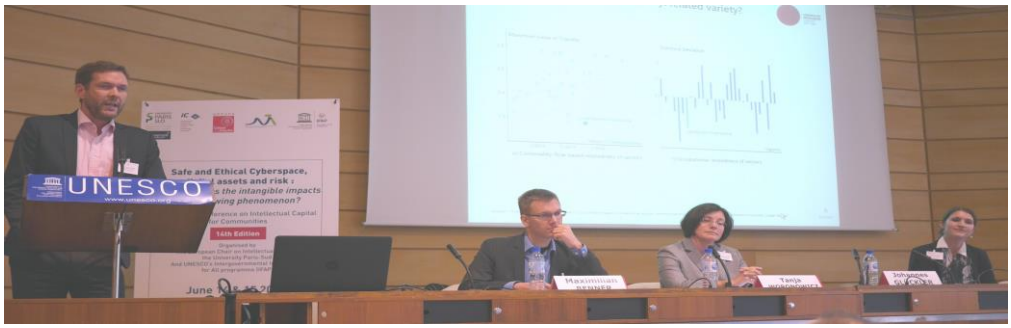
Sichel (CHS, 2005) methodology: computerised information, innovation property and economic competencies. Considering intangibles in the broad definition of Corrado (2016), and the market sector as a whole, France is relatively well ranked below Sweden in one category, otherwise always ranked top compared to the UK, Netherlands, Germany, Italy and Spain. The ratio of intangible investment to Value Added in the market sector tends to grow (from 11.8% in 1995 to 15,3% in 2014), whereas the relative shares of national accounts intangibles and other intangibles are similar. Despite the high level of intangibles investment of France relative to other countries (including in each of the three categories of intangibles identified by CHS (2005)), a big issue is that France has a disappointing performance in terms of international competitiveness. This is a puzzling and an open question that may be explained either by statistical measurement errors, or by the existence of a management problem that prevents France from efficiently combining these different assets (tangible and intangibles), or both. The high involvement of the audience on the subject led the session moderator to suggest Prof. Ahmed Bounfour to dedicate a session to intangibles measurement for IC15.

Didier Patry, CEO of France Brevets, gave a speech on the "Development of IP transfer". The missions of France Brevets which is a Public Research Organization, are the development and promotion of IP transfer for economic success, and to accompany SMEs and ETIs in their innovation activities. In their mission, they benefit from an interesting budget, increased competencies, improved processes, coherent programs, reduced volatility, centralized operations, among others, the outcome of which are the creation of a new ecosystem to foster entrepreneurial spirit, the creation of start-ups, the signature of a large number of licenses, etc. Other significant improvements on the development of IP transfer include mature start-ups and large corporations. An issue lies in the fact that there are less exporting SMEs, compared to Germany for instance.

Frédéric Caillaud from INPI gave a presentation entitled "Patents: Towards a suitable quantitative and qualitative measurement of an intangible?" He focused on the measurement of patents as intangible assets. According to him, the measurement of the quality of a portfolio of patents is long, very costly and subjective if conducted by IP experts. The use of predictive indicators leads to public information, competitors point of views and three sets of indicators: market, technical and legal. The latter method consists of a two steps process: selection of comparable set of patents, and selection of predictive validated indicators according to final use. In terms of the analysis of the technical quality of patents, technical impacts use the percentage of cited families, forward citations the average number of citations, etc. The technical diversity of measured using backward citations and the Originality and Generality index, for instance. Quantity does not match with quality however.

André Gorius from Solvay & LES France, in his presentation "IP assets and value creation", addressed the question of the multiple technology valuation challenges faced by multinational enterprises. These include Mergers & Acquisitions (identification of valuable IP assets, allocation of value of IP assets in Purchase Price, and decide which legal entity purchases IP assets), Transfer pricing, R&D and decision making (licensing in/out value) and Integrating Reporting (IP assets in the Balance Sheet, what value, what accounting principles, etc). Valuation often overlooks one simple aspect. However, qualitative value is not equal to quantitative one. There thus should be a recognition of the strengths and weaknesses of valuation: technology has an intrinsic qualitative strength, whereas economic value is an opinion which depends on the context and on many other inputs.

Session 5 – Institutional Innovation and Economic Growth



Moderator

- **Johannes Glückler**, Heidelberg University

Speakers

- **Johannes Glückler**, Heidelberg University
- **Maximilian Benner**, Vienna
- **Tanja Woronowicz**, Bremen University
- **Laura Kreiling**, Paris-Sud University

Prof. **Johannes Glucker** from Heidelberg University presented "Growing against conventional wisdom: economic development in Heilbronn-Franconia, Germany". After a presentation on the Heilbronn-Franconia planning region which is the region with the second fastest economic growth in Germany since 2000, and the fourth most prosperous region in Germany, he insisted on the fact that it is a leader in technical innovativeness. However, standard explanations of regional innovation transitions and long-term growth are incomplete and sometimes wrong in such a context. Hence, the development of this region presents inconsistencies

with growth theory. In economic terms and based on statistical tests conducted, no explanation is found as there is no evidence on association between measures of industrial and occupational structures on GVA per capita. An alternative is the understanding of the institutional context. Regional trajectories require contextual explanations and changes in trajectories often build on the specific institutional fabric in a region. Institutions, in this context, are defined as stable patterns of interactions that are often place-dependent. The Heilbronn-Franconia region has institutions that include stable patterns of doing and tinkering, of improvement innovation and technical precision, and of 'going-alone' rather than working together across firms. All these internalized institutions have supported, according to him, entrepreneurial stamina and the growth toward niche leadership.

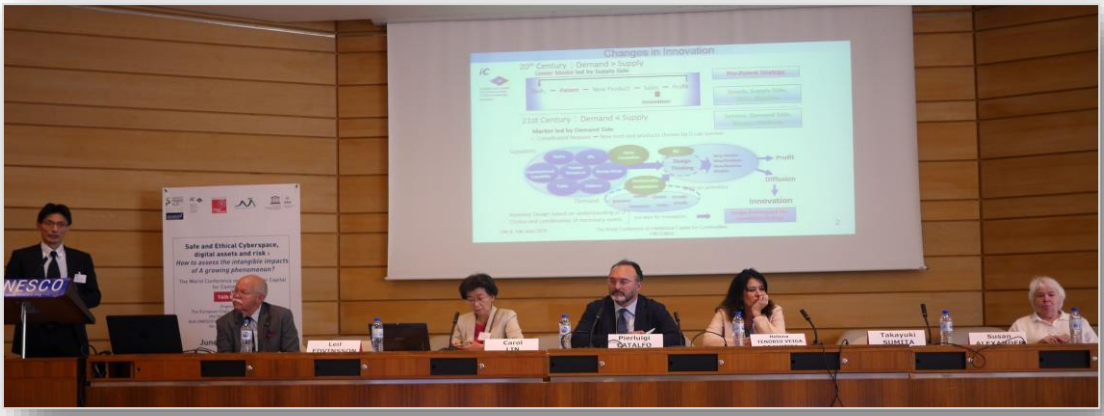
Dr. **Maximilian Benner**, economist and economic geographer from Vienna gave a speech about "the importance of policy in the digitalization of SMEs in service industries". He started by pointing out the productivity slowdown observed in OECD countries since the 1990s and early 2000s. Observing that productivity growth of the most productive firms has remained robust, he derived that the productivity slowdown is probably not due to a lack of innovation per se but to a lack of diffusion. Consequently, he emphasised the case for promoting the diffusion of productivity-enhancing innovation across national or regional economies by encouraging the use of digital technologies. In the next part of his presentation, he focused on the economic importance of services, focussing on the digitization of tourism. He provided details on a case study from a mid-sized city in Germany in which he had analysed the status quo and provided recommendations for digitizing tourism and retail in that example. In his conclusion, he emphasised the caveat that digitization is not an end in itself and the importance that policy supports the clever combinations of labour and technology so that the labor intensity of services is maintained, while the labour productivity increases through technology building new markets. Moreover, collaborative support structures such as cluster initiatives or other institutions for collaboration can be useful for overcoming barriers to service digitalization among SMEs.

Tanja Woronowicz from Bremen University presented "Innovation through Smart Specialisation in MENA Countries" thereby focussing on the European approach of Smart Specialization and providing two examples: the French region Nouvelle Aquitaine (INTERREG project P2L2) and German initiative INSIGHT MENA. The latter is a new project which has received funding from the German ministry for Education and Research (BMBF) from 2018-2022 to support Tunesian and Moroccan innovation ecosystem development. The intent is to considering responsible research and innovation principles in the context of digitalization and to pilot open access georeferenced data as enabler for cross-sectoral value creation. At the core is the development of differentiated capabilities, namely soft, hard, operational and adaptive capabilities. In terms of the EU approach on research and innovation smart specialisation strategies, Mrs Woronowicz points to the questions which are asked in this context such as 'what specialisation characterise the region?', 'how is specialisation inserted in a

global perspective?' and 'what is the range of smart specialisation in a region?'. In the case example from the France, she presented the strategic choice to consider chemistry and advanced materials as key enabling technologies for smart specialisation in Nouvelle Aquitaine region.

In her presentation, **Laura Kreiling**, PhD Candidate at University Paris Sud argued for an institutional perspective in "knowledge transfer and the impact issue". In the first part of her presentation, she introduced knowledge transfer and innovation thereby positioning her research in this field which focuses on knowledge transfer organisations (KTOs) which can more generally by conceptualised as 'innovation intermediaries'. She then went on to present her current study on the development of a holistic-practice based maturity model for knowledge transfer organisations. Mrs. Kreiling concluded her presentation by emphasising the need for an institutional perspective when studying innovation, an in particular knowledge transfer, because innovation is not only a process and its outcome but it happens within an institutional order. This means that institutional theories which focus on outcomes, such as social and economic effects of institutions, are to be deployed in this context. She presented the regulative, normative and cognitive elements of knowledge transfer as institution in the final part of her presentation.

Session 6 – Intangible Capital of Nations: An update



Moderator

- **Pierluigi Catalfo,** University of Catania

Speakers

- **Takayuki Sumita,** Secretary General, Intellectual Property Strategy Headquarters, Cabinet Office
- **Helena Tenório Veiga de Almeida**, BNDES
- **Leif Edvinsson, Carol Lin,** National Chengchi University
- **Susan Alexander,** Lux IC

The session on “Intangible Capital of Nations - an Update” was moderated by Prof **Pierluigi Catalfo**, from the University of Catania.

Takayuki Sumita from the Japanese Cabinet Office presented “Japan’s strategic vision on IP and national branding”. He started his presentation by explaining the basic structure for IP Strategy Planning involving the formulation of an annual Intellectual Property Strategy Program which is implemented by the Cabinet Office. He then pointed out the changes in innovation comparing the 20th century linear model led by the supply side and a pro-patent strategy to the 21st century in which a market led by demand side is prevalent which means that design, platforms and services have come to the fore and the role of IP in the mid-to long-term given the changing climate, characterised by the sharing economy the increasing importance of platform, the role o data to design business. In order to address these points, Mr. Sumita presents the special committee on IP Strategy vision which was created in Japan to set major goals for the early IP Strategic Plan for the medium- to long-term perspective aiming at the timeframe around 2025-2030. He provides examples from workshops and discussion groups in which the committee was divided in small groups to present ideas with posters. Mr.Sumita then presented the overall process leading to the IP Strategy Vision” for Japan which consists of five points leading to the ’Value Design Society’. This consists of three building blocks: individual empowerment, national branding and systems for combination/creation. The presentation was concluded with the mapping of Cool Japan resources and effective PR as a reference with specific examples for categories in the area of lifestyle/culture, fashion, food, object and content.

Helena Tenorio Veiga de Almeida from BNDES presented “Intangible capital of Brazil in the context of the Brazilian Development Bank Agenda. According to her, the reputation challenge is such that in times of social media, reputations are falling all over the World. Governments are a major victim of this lack of trust, but corporations and NGOs are suffering too. There are two disputing agendas: a positive one and a negative one. In terms of timeline, the privatization program is ongoing today. The BNDES is of charge of measuring other intangible capital to boosting its own external relations capital. The project “Developing Futures” consisted of three phases: challenges, identity and plan. The project had an intense agenda of external consultations and engagement of the house in a transformation journey. The deliverables of the project include several high impact products that will serve as a basis for an organizational transformation. According to her, knowledge networks help in topics

and issues related to Strategic Reflection. As a result of the diagnostic phase, key issues were identified where the BNDES performance can contribute to the country.

Leif Edvinsson and **Carol Lin** from the National Chengchi University gave a speech about "Intangible capital of Nordic countries". Starting with the example of Spotify in terms of Artificial Intelligence, they observed that global tangible resources are limited and depleting day by day, whereas intangible resources such as knowledge instead accumulate over time. The Nordic's secret recipe for success lies, according to him, mainly on intangibles that include honesty, transparency, trust, individual rights together with structural reforms and human capital. The question, according to them, is whether the Nordics maintain are status as "leader of the pack" or are there hidden complacencies that may drive performance downwards instead? In their research, they explore measurements and models for national intellectual capital with specific application to Sweden…

Susan Alexander presented the topic "Adding Ethics to the IC Mix". According to her, there is a missing intangible which is Ethics. In fact, there are few studies of organizational intangibles of companies or countries that include the ethics dimension. The basic assumption of intangible capital is that intellectual capital leads to innovation which, in turn, leads to profits and prosperity. However, ethics impose costs on an organization and their impact are on corporate profitability and national prosperity like in the refugee crisis. In addition, as an intangible, it is appropriate to include ethics in any assessment of organizational intellectual capital. In their definition of ethics, they include respect for others and their human dignity, justice and fairness, responsibility for the consequences of one's actions. In addition, criteria will borrow from the Hippocratic Oath and include the "Do no harm" philosophy.

Session 7 – Digital platforms, competition policy and innovation

Moderator

- **Gérald Santucci,** European Commission, DG Connect

Speakers

- **Xunhua Guo,** Tsinghua University
- **Christian Reimsbach-Kounatze**, OECD
- **Ahmed Bounfour,** Paris-Sud University

The session was moderated by **Gérald Santucci**, retired from the European Commission and DG Connect.

Xunhua Guo gave a presentation on "Digital platforms in China: an institutional perspective". The scale of digital economy in China is USD 4.25 trillion and corresponds to 32.9% of the Chinese GDP. It essentially consists of e-commerce, mobile payment and bike sharing. The leading platform companies, known as the BAT and consist of Baidu, Alibaba and Tencent. The Two-sided platforms are an institutional phenomenon and the two economic problems associated with is are distribution and creation of wealth, the basic unit of analysis consisting of transactions of three types: bargaining, managerial and rationing. In relationship with combining resources, the online trading platforms and the online service delivery platforms are well facilitated, the virtual clusters are emerging, and the industry-wide information infrastructures are underdeveloped in many industries. Focusing on the industry-wide information structure, the interpretation is that there is an institutional void in China's pharmaceutical distribution industry: neither a top-down nor a bottom-up development process working, and the institutional structures needed to support a combined approach as it is practiced in Germany, are not available in China.

Christian Reimsbach-Kounatze, OECD, presented "How do platforms use data for innovation". In his presentation, he insisted on the fact that platforms operate in many areas including transportation (e.g. BlaBlaCar), Finance (e.g. TransferWise), Consumer goods, Space, Personal services and Professional services. Such platforms re-intermediate transactions. They also enable P2P, B2C and B2B. In his definition of an online platform, he said that these are digital services that facilitate interactions between two or more distinct but interdependent sets of uses who interact through the service via internet. Online platforms are multi-sided markets which are enabled by data thanks to its economic properties. Online platforms are different from digital ecosystems in that the latter are combinations of interoperating applications, operating systems, platforms, business models and/or hardware, and not all components of the ecosystem must be owned by the same entity. Such ecosystems may be more or less open to competitors and third parties, depending on the openness of the ecosystem's APIs. After a presentation of the Facebook and Google ecosystems, and putting all these in relation with data, he insisted on the fact that data is the "new R&D" for innovation as it is on the centre of sectors such as the public administration, agriculture, health, retail transportation, science and education sectors. Data-driven-innovation (DDI) thus refers to the use of data and analytics to improve or foster new products, processes, organisational methods and markets. DDI is not only about big data but is also about the data value cycle. Data and analytics start-ups in digital related sectors are the ones that attracted the largest equity funding in the 2011-2016 period, with up to 63% of total equity funding in digital related sectors in Estonia. In addition, large firms are more likely to adopt big data, in particular if they are ICT firms. The source for big data used differs also significantly across countries and there are many new business opportunities for data driven businesses and analytic service providers. The use and re-use of data is enabling new business models. However, the major policy issues that need to be addressed is first that data is not oil but an infrastructural resource with large spill-overs. In this context, data is non-rivalrous, it is a capital with increasing returns and it is a general-purpose input with no intrinsic value. Second, a key dilemma is on striking the right balance between openness (open data, multi-purpose reuse, data portability, algorithmic transparency) and closeness (privacy, confidentiality, user lock-in, walled garden, digital security). Digital security risks could be, according to him, a major barrier to big data adoption as the risks of a security breach are shown as being the main reason why businesses do no use cloud computing. The good news is that data openness is not a binary concept but spans a continuum. The bad news is that data ownership is a fuzzy and therefore unpractical concept as it means different things.

Prof. **Ahmed Bounfour** from Paris-Sud University presented "Platforms and platformisation in an intangible resources perspective and their implications for innovation". He identified several issues related to platforms as a mode of organising. These issues come mainly from two sides: the business side in relation with the competitive conditions, relations to customers, suppliers, complementors and ecosystems; and from the policy side in relation with the competition policy, the innovation policy and the society as a whole. The economic benefits include increases in the potential for innovation, in productivity and international trade, as well as increases in the access to resources for business. Social benefits include more information and a better engagement with public authorities and the society. The risks of platforms include market dominance that leads to less innovative suppliers, platforms advertising their own products and control of the society and challenges for the Hobbesian sphere that places the Government as a "peacekeeper". In the literature, there have been different arguments to consider platforms as markets or as an organisation design. A platform can thus be defined as a space for bundling the firm's ecosystem's resources for innovation, those for the heterogeneous users, as well as those of suppliers, partners and complementors. There are three analytical approaches : the engineering approach in which the platform is a set of common elements to be used in the modular architecture, the industrial economics approach with the multi-sided markets concept put forward by Rochet and Tirole (2004) and for which the two main issues are the lack of incentives to innovate and platforms as substitutes for public services; and platforms as a set of strategic choices with, for instance, the issue of openness versus control. In terms of types, there are three types of platforms companies: transaction (e.g. Uber, Tencent, Paypal), innovation (e.g. Intel, Microsoft, Oracle), integrated (e.g. Google, Facebook, Apple, Alibaba) and investment platforms (e.g. Naspers, Priceline). While the transaction type platforms include both public and private, the other types of platforms are mostly public. The question is how do platforms contribute to innovation?

Session 8 – Intangible capital in global value chains

Moderator

- **Thomas J Housel,** NPS

Speakers

- **Sacha Wunsch-Vincent,** World Intellectual Property Organisation (WIPO)
- **Wen Chen**, University of Groningen

Panel discussants

- **Jean-Éric Aubert,** Fondation 2100
- **Takayuki Sumita**, Cabinet Office, Japan
- **Hannu Piekkola**, University of Vaasa

The session was moderated by Prof. **Thomas J Housel** from NPS. The session mainly discussed findings and arguments of the WIPO report on Global Value chains.

Sacha Wunch-Vincent from WIPO and **Wen Chen** from the University of Groningen started their presentation entitled "The role of intangible capital in Global Value Chains" by presenting the example of smartphones and coffee to show that customers are paying for intangible capital, highlighting their role of driving force of retail prices and value-added. They begin by providing evidence for the rise of global value chains and the parallel rise of intangible assets, then the macro perspective is discussed to highlight the returns accrued to intangible capital. This is followed by a part in their presentation which focussed on the micro perspective which in fact was a

case study on the smartphone market and the computation of the value capture estimate which is the residual after the cost of materials, assembly and labour costs and distribution costs are deducted from the smart phone retail price. In this given example, they highlight the measurement challenge which is that IP payments are not explicitly captured but embedded in the price. In the last part of their presentation, they present a future measurement agenda, highlighting that on the macro-level, international stats initiatives are steps in the right direction but that open issues remain which concern the attribution of returns in a GVC to particular industries and the quality of databases. On the micro-level, they point out that teardown reports are useful starting points but more data is required on IP transaction – in particular on the product level.

The presentation was followed by a panel discussion with **Jean-Éric Aubert** from France, **Takayuki Sumita** from Japan and **Hannu Piekkola** from Finland who each provided reflections and further foods for thought on the research and propositions by the previous speakers Sacha Wunch-Vincent and Wen Chen.

Each speaker particularly focused on their respective country-specific view point and provided examples, such as Finish regions which use knowledge in tasks and business function specialize in exports and imports to internationalise which is possible in a small IC intensive open economy like Finland.

Session 9 – Intangibles and value: the micro/macro dialogue, what should be next steps

Moderator

- **Inge Wulf,** Clausthal University

Speakers

- **Feng Gu,** School of Management, University at Buffalo
- **Hannu Piekkola**, University of Vaasa
- **Marianne Paasi,** TU Berlin
- **Yasuhito Hanado**, Waseda University
- **Yoshiko Shibasaka,** KPMG Japan
- **Thomas J Housel, Wolfgang Baer** and **Richard Bergin**, Naval Postgraduate School

The session was moderated by Prof. **Inge Wulf** from Clausthal University.

Prof. **Feng Gu** gave a talk entitled "Accounting and financial reporting in the intangible economy: challenge and solution". After presenting evidence about the loss on accounting relevance, for instance for investors, he discussed the relevance of such loss. In particular, the rise of intangible assets and their absence and distortion in accounting reports are one reason. In fact, investment in intangibles is treated as expenses, leading to total assets and firm performance metrics being distorted. Another reason is the prevalence of estimates in accounting. Ignorance and delayed recognition of important business events are also one of the reasons why accounting relevance is lost. According to him, intangibles can be found in R&D (patents, software, copyrights, design database, etc.), in customers through market research and investment (brands, trademarks, on-line distribution channels, marketing alliances, etc.) and in organisation design and development

(supply chain, integrated production and inventory systems, etc.). Thus, there is a rise of intangibles and a fall in accounting. Accounting for intangibles is inconsistent, opaque and even misleading. According to the studies conducted, earnings are less relevant for firms with more intangibles. The reasons for such a puzzle are that U.S. accounting standards (GAAP) produce financial reports that distort the value and performance of these firms. In addition, disclosure requirements may have adverse effects, leading to unfavourable valuation. Another reason is that early-stage intangible-intensive firms increasingly shun away from public equity markets. Their proposal is to treat intangibles as assets in accounting reports. In such a setting, there is a new tool "Strategic Resources & Consequences Report" that provides a framework for disclosure about strategic resources, most of which are intangibles, and organizing principles for CEOs, CFOs and managers who want to provide useful information in a more integrated way and is based on what really matters to investors and managers. Strategic resources generate net benefits, are rare and difficult to imitate and are key for achieving and maintaining a sustained competitive advantage. In terms of recommendations, they propose to reform financial reporting to better serve the intangible economy by: focusing on strategic resources, providing better information by returning to fundamentals (fact-finding and reporting rather than estimating, forecasting and valuating non-traded assets), and reducing the short-term orientation od current reporting approach by, for example, eliminating quarterly reporting.

Prof. **Hannu Piekkola** from the university of Vaasa in Finland gave a speech about the Future of intangibles. He started with a presentation of the Innodrive project which aims at reducing our ignorance by providing new data on intangibles and new estimates of the capacity of intangible capital to generate growth in the 2008-2011 period. He insisted on the model and data that are obtained by linking employer-employee data. He also presented the Globalinto project that aims to capture the value of intangible assets in micro data to promote the EU's growth. In their proposal, there are new measures of intangible assets at the firm level in co-operation with statistical offices. In addition, their proposal aims to fill an important gap in measurement which has restricted statistical production, micro-based analysis and evidence-based policymaking. The proposal also aims to analyse the various potential explanations of the productivity puzzle, both at micro and macro levels. In terms of future work, there is a work with remote access to Statistical Offices data to capture environmental and intangible capital driven innovation and productivity. In addition, a production of performance-based estimates, in particular the productivity of intangible capital work and its value-added share using output elasticities from production function estimates is planned. To propose broad R&D to evaluate market value of firms and intangible capital, innovations and firm performance in a dynamic framework and as part pf value chains.

Dr. **Marianne Paasi** from TU Berlin , the Chair of Innovation Economics presented "Opportunities from ideas and intangibles – digitalisation and cybersecurity policy". She introduced her talk by presenting the three transformations that, according to her, are knowledge economy and society in which intangibles transform ideas, data and technology to innovation; digitalisation as critical infrastructure that broadens the boundaries of communication and exchange in the economy and society; and globalisation opportunities in the global value chains. These three transformations also challenge economies, societies and governments. The knowledge economy and society is highly competitive and potentially unequal as there are winners and losers.

Digitalisation can have negative, social and unethical effects such as cyber-attacks that can paralyse societies, economies, governments and democratic foundations. It is thus highly risky and has high costs. Globalisation increases competition and change in the economy and society further. In particular, winning or losing depends on the position in the global value chains and on the capacity to change. As a consequence, strategic assets can lose the value very fast. There are thus conditions to exploit the three opportunities mentioned. These are to provide ideas production in the public and private research and use from everywhere, to develop new innovative business models of start-ups and existing firms who take-up and combine ideas, big data, skills, organisational capital and digital skills; to make available finance and risk finance to start-ups, to modernise and to scale-up. In addition, cybersecurity is an essential and necessary condition: trust and to feel safe on line, to fight cyber-criminality, espionage. However, this has a high cost. A last condition is to have an open trade system.

Prof. **Yasuhito Hanado** from Waseda University presented their next steps on WICI's Intangibles Study and Research. After a presentation of developments on intangibles studies and researches, he listed their next projects that consists first of listing up intangible key success factors of Start-up business and preparing framework of the. Such a work is conducted by Dr. **Tadashi Takiguchi** from Waseda University who gave a talk on Intellectual Capital for the start-up community: what should be the next step? In his research, he pointed out the next step of the business reporting of Japan for which there is difficulty of using integrated report framework for start-ups, which also have lesser resources compared to large companies. There thus needs to be effort made to speak with stakeholders at each stage of growth of start-ups and SMEs. Start-ups and large companies are different because for the latter, the type and classification of the intangible on which to focus might be different.

Focusing on ZUVA which is the university-led start-up incorporated on 2017 by Kyoto University and Waseda University, he insisted on the fact that ZUVA is a unique information provider of intellectual capital/asset for start-ups using AI technology for investors and the top decision-

makers at various enterprises. ZUVA develops start-ups according to the original framework of intellectual capital/asset. In the later part of 2018, ZUVA will make begin as an information provider. Based on the work conducted by **Prof. Hanado**, ZUVA focuses on the Intangible capital/asset and the capability as business resources for start-ups to inform investors and corporate decision-makers of corporate value in the future. The other project is to do a listing up intangible key success factors of local community sustainability and preparing framework of them. Such a work is carried out by **Dr. Satoshi Funahshi** from the Intellectual Capital Management Group (ICMG) from Waseda University who presented Perspectives, Vision for the future.

Yoshiko Shibasaka from KPMG Japan presented the KPMG Integrated Reports in Japan 2017. After a brief overview of movements in Japan that consist of an overall optimization of the "Investment Chain" which includes a number of issues to corporate disclosures, he presented the three recommendations for communicating more robust value creation story. The first recommendation consists of communicating a more robust value creation story with the financial strategy. The second recommendation is to present the issues the company see as material to its medium to long term value creation. The last recommendation consists of presenting non-financial indicators relevant to the value creation story in order to deepen reader understanding. The next steps are to define an Integrated Reporting for Sustainable Corporate Value creation with four main aims: as a tool to promote insightful communications, to ensure reliability and transparency, top management leadership and total optimization and integrated.

Prof**. Thomas J Housel, Wolfgang Baer** and **Richard Bergin** from the Naval Postgraduate School presented the Econophysic approach-update and extensions. According to them, value is the problem. For example, evaluating acquisition investments in defence and governmental organizations do not have a non-monetized, quantitative common units value parameter and the value/cost of acquisitions of information technology are problematic for this reason, especially given that most information technology applications have large amounts of embedded intellectual capital as well as risk. The value of such embedded intellectual capital cannot be determined via traditional accounting and finance and a new theory of value is required to account for this called "missing value" phenomena. Economics and physics have a number of analogies that can be used in such a setting. The first step in modelling of intellectual capital consists of building a simple equilibrium economy that shows the flow of action in various forms as they progress in time through the economy and interfacing with Nature. A framework of principles for developing quantitative calculations for creativity and intellectual capital consists of treating business plan as a program implemented by economic participants, mapping the control interactions between the business plan and economic participants, analysing the generation of new interactions with Nature as a source of creativity, calculating the complexity of the business plan in execution of action bits, and utilizing the Quantum Physics analogy with a defined value of the Proto. To sum up, it is necessary to model the mental operations of

acquisition investment organisational leaders and consumers, clients, users to understand how value is created frim intangible capital. Doing so will allow the model to consider decision maker mental biases as well as predict adoption rate and acquisition failures. The model consists of integrating risk and volatility into the protovalue estimate within the non-profit Defence Acquisition program framework. A next step consists in identifying intellectual and creative inputs to consumer/work life plans via empirical work using acquisition case studies.

Conference closing

The Conference was closed by Dr. **Boyan Radoykov** of UNESCO, Prof. **Ahmed Bounfour** from the University Paris-Sud, and **Chafica Haddad** of IFAP. They thanked all conference participants for their active engagement and interest in the subject area. They acknowledged the interesting conversations that were evoked from the large variety of themes that were discussed during these two days. Prof. Bounfour thanked Dr. Radoykov, Chafica Haddad and their team, the chair sponsors and partners, and the team at University Paris-Sud who was involved in the organization of the conference. He wished everyone a safe travel home and was looking forward to meeting many colleagues again at IC15 conference next year.

"Safe and Ethical Cyberspace, digital assets and risk :
How to assess the intangible impacts of A growing phenomenon?"

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