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GREEN PAPER

CCI INNOVATION TO LEAD BEYOND THE PANDEMIC

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European Creative Industries Summit

CCI Innovation to Lead Beyond the Pandemic

Michela Magas

"No one can imagine a smart city of the future without cultural and creative sector, without the talent, without the value and without the richness of what you bring to us." Mariya Gabriel[i]

Abstract

The transition of Culture and the Creative Industries towards a more distributed, asynchronous, agile, geographically-independent, rapid creation model enabled by digital technologies, has accelerated exponentially during the Covid pandemic. The transformation of the sector had been gaining momentum before the current crisis and had been progressively speeding up ever since the advent of Napster on the 1st of June 1999[ii], when the hacking subculture was the first to exploit affordances of Peer-to-Peer digital asset sharing to establish communities at a grand scale, and simultaneously precipitated the music sector into an overnight digital transition[iii]. Since then models implemented by the CCI in response to early challenges, which utilised emerging technological affordances, have become a universal template for digital transformations across other industries. The CCI approach to knowledge acquisition and methodologies for experimentation have proven to be the key ingredient of the processes required to manage complexities emerging from frontier technologies. With increased demand for collaboration to solve grand societal challenges highlighted by the recent crisis, a new anchoring of the CCI as central facilitator of the data-driven cross-domain economy is emerging with a horizontal function that bridges all domains. Within this paper we list the priorities for the repositioning of the CCI at the centre of cross-domain industry innovation.

A testbed for digital transition

The advent of Napster forced the music industry to migrate overnight from tangible product to the digital format, adopt the cloud as a warehouse, turn to the data spreadsheet as the album crate, and use music metadata to replace attractive album covers as means of identification. The entire sector was suddenly in urgent need of reinvention, taking account of the spiralling losses, and the risk of sector collapse. The state of emergency required the adoption of fast learning methods to discover and exploit novel affordances of big data management, machine learning, application programming interfaces (APIs), intellectual property tracking, and streaming services, in hope that solutions may allow the sector to re-emerge with renewed market agility. Entire communities have sprung up to join forces in the attempt to address the challenges presented by this overwhelming shift in the way we create, record, communicate, exchange, and conduct business[iv]. It is perhaps no surprise that members of those communities have most recently acquired Napster, having accumulated 20 years of new knowledge and hindsight about possible data-and-communities-powered business models and creative communication affordances of technological drivers[v].

During the past decade, creativity has been powering the greatest volume of communication traffic. The rise and dominance of content creators[vi] and creative platforms which speed up communications and allow more agile ways to exchange information, have influenced even the more traditionally community-driven physical bookstores to consider new ways to deliver narratives. During the pandemic, when a trip to the local bookstore became a risk, digital communities of book lovers sprung up even from those physical places of personal exchanges of ideas, and survived thanks to novel modes of communication[vii], following a trajectory that the music industry went through 15-20 years earlier.

The rise of digital content creation and innovative ways to deliver narratives has gradually affected the design of systems and processes. Novel technological affordances have enabled new modes of expression; novel

languages of expression have evolved into new community (sub)cultures; with new (sub)cultures new values have arisen that drive emerging markets for both cultures and economies, requiring a rethink of their supporting systems and regulatory aspects. Cultural transformation was not only evident across Culture and the Creative Sector, but progressively across other industries and particularly service sectors, influenced by the same communication technology drivers.

Financial services quickly migrated to a more agile model using what became the central nervous system of the data-driven economy – the APIs[viii] – to establish robust horizontal mechanisms for data exchange. In Sweden, what happened to the music industry around the year 2000, happened to the financial services around 2015 – paper money disappeared as the most common means of exchange. Stock markets and banks moved finances as data long before then, but the cross-domain horizontal model required novel API-driven financial services to be linked to fully digitalized government UIDs[ix] and the taxation system for traceability and accountability, and ostensibly secure connection to IoT Tangible User Interfaces (in this case personal mobile phones) to be enabled as wallets. The same portable data device model as the iPod for the music industry, which was result of creative invention back in 2001, is now, with ubiquitous connectivity, the basis for faster and more secure financial exchanges, considerably speeding up the service economy.

Few believed that the transformation of the CCI would provide a model for all other industries. Mining or chemical production remained firmly anchored in real world processing of raw materials, and considered data-driven processes only as part of its supporting supply chain. It was not until SAP, in April 2019, published a whitepaper outlining their ability to manage the entire production process for the chemical industry - from start to finish - through data-driven systems[x], that the established CCI model finally resonated with the chemical sector, resulting in the hypothetical question: "Wait, are we now just *'content'*"?

Before Covid-19, but even more so during the recent pandemic, digital content has been accumulating exponentially, led by the need for active participation and creative expression. While the public discourse has been preoccupied with the means of distribution – screens and videoconferences – *content* is the digital value category which has kept us actively engaged with society during the era of quarantine. It is also the digital category which carries within it all of the transformational affordances on offer by digital communications to generate new meaning – from appropriating traditional cultural narratives to automatising generative outputs of big data frontier technologies. While this provides emancipatory social and cultural potential that may or may not be supported by the technological platforms, it also in turn carries all of the threats associated with narrative spin, bias, manipulation, unethical use of technology and irresponsible use of data.

The ambition of extracting meaning or value from big data has led to research and experiments across knowledge domains in deep learning with neural networks, and uncovered challenges of real-time classification – or algorithm-driven 'meaning making' - impeded by the sheer volume and speed of outputs resulting in *unknown unknowns.* The challenges of unknown unknowns are being reported across knowledge domains, though perhaps significantly in physiology and cyber-physical systems where the human is in-the-loop, and where solutions are particularly relevant for the current pandemic[xi]. In creative experimentation where innovative use cases utilise machine learning and artificial intelligence for interaction with humans, or utilise complex systems with the human-in-the-loop, the results have shown to be highly unpredictable[xii]. To date, no deductive or inductive scientific method, building on prior art or statistical probability, has offered a reliable solution for dealing with such surprising outcomes. In this context creative elicitation approaches[xiii] and methods of meaning-making in complex conditions, become a fundamental ingredient of the digital shift.

Compared to the scientific method of deduction and induction leading to a conclusion, which appears highly rational, the creative practitioners' brain training has always been perceived as far less linear and rather chaotic, opening up too many possibilities, or somewhat irrational and perhaps too reliant upon some kind of instinct. Recognition of the rigour of the creative practitioner, trained to observe and evaluate cultural phenomena on a 24/7 basis, and practice problem-solving by illuminating subject matter from as many perspectives as possible, is now a requirement for the creation of new knowledge in a highly complex, rapidly changing data-driven landscape, full of challenging outcomes.

The current pandemic is one of a series of *black swan events*[xiv] regularly occurring to humanity, and acquisition of knowledge has proven to be the key concept for managing the associated risk[xv]. Methodologies and solutions for the current pandemic must be based on a long-term view of recurring scenarios which are unpredictable and hence non-computable in terms of statistical probability, or result in negative impact for society when combined with methods which are risk-averse and ill-equipped to face uncertainty, particularly those that lack agency. Creative experimentation offers agency in joining knowledge from across cultural and industry domains, inclusive of radically different views and ethical considerations. The creative practitioner's rigorous methods of questioning the subject matter from various perspectives which result in the ability to make meaningful connections between seemingly unconnected phenomena are proving to be essential tools for generating new knowledge from unknown unknowns and mediating the systemic change required to manage complexity.

Positioning the CCI at the centre of cross-domain innovation

Intensified cross-domain collaboration and a new approach to the acquisition of knowledge is a requirement of the current multiple simultaneous humanitarian crises. Within this context, the CCI possess qualities which can spearhead the systemic change required for the reordering of knowledge, skills, supporting systems and future tools. The repositioning of the CCI as an essential driver and shaper of the new cross-domain data-driven landscape highlights a series of new roles for the sector:

- **The CCI as the engine of cross-domain industrial R&D**
  Recent cross-domain industry consultations have revealed requests from industry stakeholders for experimentation which would help them test unexpected outcomes of novel use cases which are emerging when implementing data-driven, and particularly AI-driven systems in e.g. manufacturing processes[xvi]. The CCI are seen as the leading sector in experimental prototyping methodologies which translate thought into practice in order to uncover unforeseen scenarios in a safe environment, before technologies are fully deployed (e.g. design of brain-computer interfaces for interacting with machinery in order to increase safety at work). These environments for experimentation are typically goal-oriented, driven by societal challenges, and informed by best practice from the long experience of CCI sectors in digital transition. They include testing supporting systems of attribution and tracking of intellectual property in value networks, novel business and collaboration models, and methods which have been successful at motivating moonshots and have led to breakthrough innovation. This in turn provides the framework for testing more agile legislation and/or policy in order to reduce negative incentives and improve the evidence available for decision making, thus feeding policy recommendations directly from the grass roots or from working practice.

- **The CCI as key to innovation in the new cross-domain economy**
  The innovation of the new integrated data economy extracts value from the intersection of cross-domain assets – with hybrid applications, novel use cases, imaginary scenarios, creative simulations, emerging market explorations and solutions to societal challenges. One example is transfer of gesture and data-driven IoT for music playlisting into breakthrough innovation for communication and control systems in heavy duty vehicles for the primary industry[xvii]. This results in "a new category of innovation, driven by cross-sectorial, cross-domain and cross-societal solutions"[xviii]. The CCI are ideally placed as early adopters of new technologies, by operating close to emerging markets and uniquely positioned to actively connect industrial and knowledge domains into value ecosystems.

- **The CCI as provider of key skills for radical shifts in society, markets and economies**
  Skills such as human-centric design, system design, content design and curation, innovative applications of industrial tools and services, and creative innovation methodologies, based on best practice from a long tradition of design and innovation in the CCI, have evolved with the latest technologies to become essential ingredients of the data-driven economy.

- **The CCI powering agile data exchanges through the design of interfaces**
Digital interfaces are the most agile enabler of industrial data marketplaces. As well as the traditional CCI domain of the design of graphic user interfaces which are essential drivers of software platforms, the CCI approach has proven very successful at addressing the functionality and applicability of APIs to novel use cases. More recently the CCI have proven to be best placed to exploit the huge potential of tangible user interfaces (TUIs[xix]) which interact with ubiquitous IoT data in smart cities and regions. An example of what could be considered a tangible user interface is the design of data-driven bike-sharing facilities.

- **The CCI contributing to digital narratives which amplify and stimulate the digital economy**
As well as leading on audio-visual digital content creation, the CCI sector narrative potential now extends to continuously tracked IoT embedded in all physical spaces, and all objects, artifacts and products, with renewed potential for building culture and meaning in public spaces. In this sense, for example, the data-driven bike-sharing scheme mentioned above becomes the narrative interface between politicians and the civil society.

- **The CCI enabling rapid upskilling and lifelong learning**
Collaborative and experimental CCI environments have proven to be conducive to rapid knowledge transfer between diverse participants from a variety of social, cultural and professional backgrounds. CCI supporting mechanisms for learning have demonstrated the potential to empower people of all ages and abilities, and unlock new talents and capabilities. Regular considerations of inclusivity, gender equity and accessibility, enable all talent to contribute to innovation for the economy. Some sectors of the CCI have demonstrated the ability to attract high percentages of female participants in technology prototyping, through goal-oriented, creativity-driven, socially-responsible activities, which address major societal challenges and UN Goals[xx].

- **The CCI safeguarding the social and ethical dimension of human-centric technology**
CCI lead on experiments with humans-in-the-loop, where the technological impact of frontier technologies on human beings – such as AI, deep learning and brain-computer interfaces – can be tested in safe environments, and challenges addressed before technologies are deployed at scale. These experiments test the extent to which the technology enables or obstructs human agency, decision making processes and accountability. This dimension is directly linked to safeguarding health and wellbeing, including new data-and-media-driven issues of privacy, bias and discrimination, physical distancing and isolation, and social media impact on mental health. The resulting technological innovation must be "value bound to human dignity of the individual", and "socially bound to resilience"[xxi].

These observations and recommendations also raise important questions about the policy and industrial infrastructures that could best make use of the opportunities and affordances of the CCI as central to cross-industry innovation:

- What economic and policy mechanisms can more equitably reflect the respective value contributions of creative production and content distribution?
- How can industries participate in and maximise the new cross-domain knowledge and innovation led by the CCI?
- How can creative experimentation that builds new ideas on top of intellectual property from different domains safeguard, attribute and exploit that IP in a controlled and fair manner?
- How can knowledge from the emerging markets explored by the CCI feed back to other industry sectors?
- How can the CCI contribute to the design of a cross-domain ontology ecosystem and facilitate communication across industry sectors?
- How can we ensure sufficiently agile supporting infrastructures to enable the CCI to successfully deliver on the new role and responsibilities at the centre of cross-domain industry innovation?

[i] Opening speech in *The role of the Culture and Creative Industries post-Covid in preparation for the EIT CCI KIC*, in CITIES, DESIGN AND INNOVATION, Umeå, 2 September 2020.

[ii] Shih Ray Ku, R. *The Creative Destruction of Copyright: Napster and the New Economics of Digital Technology*, The University of Chicago Law Review Vol. 69, No. 1 (Winter, 2002).

[iii] The Wikipedia *Timeline of file sharing* places formats for the sharing of music content immediately after the emergence of the World Wide Web, with the advent of Fraunhofer's MPEG-1 Audio Layer 3 (MP3) becoming a standard. Available at: https://en.wikipedia.org/wiki/Timeline_of_file_sharing.

[iv] The *Music Tech Fest* global community of over 7500 innovators is one example of a transdisciplinary community which was born stimulated by this transition. Available at: https://musictechfest.net/.

[v] *Napster's New Bosses Want To Make A New Kind of Music-Streaming Giant,* Rolling Stone, 25 August 2020. Available at: https://www.rollingstone.com/pro/news/melodyvr-buys-napster-streaming-service-1049716/.

[vi] Magas M., *Supporting Creative SME Content Creators*, ECFI, Brussels 3 April 2014. Available at: https://www.youtube.com/watch?v=FU_lVCeyXt4.

[vii] BBC Culture, *As more countries go into lockdown, bookshops around the world are having to think of creative ways to serve their customers and communities, writes Clare Thorp.* Available at: https://www.bbc.com/culture/article/20200323-covid-19-how-bookshops-around-the-world-are-responding.

[viii] *How APIs open the door to new aggregated services.* Technative, 6 March 2017. Available at: https://www.technative.io/apis-open-the-door-to-innovative-new-aggregated-services-global-study-reveals/

[ix] Swedish User Identifiers are standardised across services utilising the Swedish National Personal Number.

[x] *Empower the Intelligent Chemical Enterprise with SAP and its Ecosystem*, SAP, 24 April 2019. Available at: https://www.chemanager-online.com/en/whitepaper/empower-intelligent-chemical-enterprise-sap-and-its-ecosystem.

[xi] Bogdan P. (2019). *Taming the unknown unknowns in complex systems: challenges and opportunities for modeling, analysis and control of complex (Biological) collectives*. Front. Physiol. 10:1452. 10.3389/fphys.2019.01452

[xii] See the MTF use case of the blind singer, for example, in "7 ingredients for the Industry Commons", published on 21 February 2018, and available on https://michelamagas.com/7-ingredients-industry-commons/

[xiii] Sutcliffe, A. and Sawyer, P. (2013). *Requirements elicitation: Towards the unknown unknowns*. Requirements Engineering Conference (RE), 2013 21st IEEE International, IEEE.

[xiv] Taleb, NN (2007). *The black swan: the impact of the highly improbable*. Penguin, London

[xv] Flage R., Aven T. (2015). *Emerging risk – conceptual definition and a relation to black swan types of events*. Reliability Engineering and System Safety, 144 (2015), pp. 61-67

[xvi] Workshop report on "Common European Data Spaces in Smart Manufacturing", European Commission, 16 September 2019

[xvii] See the MTF use case of transfer from CCI experimentation to a patent for primary industry, in "7 Ingredients to build a successful innovation ecosystem", published on 28 March 2016, and available on https://michelamagas.com/7-ingredients-to-build-a-successful-innovation-ecosystem/

[xviii] Bernd Fesel at *The role of the Culture and Creative Industries post-Covid in preparation for the EIT CCI KIC*, in CITIES, DESIGN AND INNOVATION, Umeå, 2 September 2020.

[xix] Hiroshi Ishii. 2008. The tangible user interface and its evolution. Commun. ACM 51, 6 (2008), 32--36.

[xx] See the MTF statistic of 53% female participants in an 800+ technology prototyping event driven by those principles, in the keynote to INNOVEIT 2019: https://www.youtube.com/watch?v=9nYCMBkn4Ro

[xxi] Ibid.