DIGITAL MEDIA READINESS

WORLD ECONOMIC FORUM

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White Paper

The Digital Media Readiness Framework

Global Agenda Council on the Future of Media, Entertainment & Information

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DIGITAL
MEDIA
READINESS

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Introduction

All communities should answer the key question of how digital infrastructure can be put to use in improving their citizens' lives. Access to and use of digital platforms, services, products and content drive economic and social well-being. Thus, the concept of a country's readiness in digital media, entertainment and information (MEI) requires further investigation. This report serves as a living document, as MEI industries develop and change at unprecedented speed.

The World Economic Forum's *Global Information Technology Report*, which assesses the preparedness of information and communications technology (ICT) of more than 140 countries annually, has consistently shown strong links between a nation's level of ICT readiness and its ability to benefit from it both economically and socially. In particular, a wider discussion on digital readiness needs to include digital infrastructure as an important building block. The emerging fields of artificial intelligence, the Internet of Things, blockchain and virtual reality, along with many other technological innovations, will undoubtedly change MEI as much as the internet browser and social media have done so far, which only amplifies the need for digital media readiness.

The World Economic Forum's Global Agenda Council on the Future of Media, Entertainment & Information has developed the Digital Media Readiness (DMR) Framework, which will assist in measuring a community's access to and use of MEI products, services and content, referred to simply as "digital media". Communities can include nations, cities or any other collective of citizens that can benefit from digital readiness. An application of the framework can be used to help rank countries or cities according to their readiness to participate in and embrace digital media, and to stimulate investment in areas that increase readiness. However, actual ranking would require further development of the metrics layout for each indicator in the framework, including the measuring of each across a significant community base. The framework can also help create clarity and consistency between communities on the following:

- Citizens' access to and ability to afford broadband internet
- Citizens' literacy to engage with digital MEI
- Capabilities of industry to distribute and communicate on MEI content and services, using audience-preferred platforms
- Sustainable monetization models to ensure a thriving and healthy local MEI industry
- Cultural openness, legal structures and policies to provide citizen safety and industry prosperity

Metrics to measure DMR include (but are not limited to):

- Broadband and mobile penetration
- Freedom to publish
- Availability of content licensing infrastructure
- Level of content piracy
- Freedom from censorship
- Freedom to establish new enterprises
- Open telecommunications platforms (level of regulation)
- Availability of venture capital
- Digital MEI literacy

The council's DMR Framework consists of currently defined and measured indicators from existing, active and related indices (listed in the methodology section); new indicators that require design and application; information on interdependencies between all indicators; and, finally, case studies of best practice for increasing indicator levels from existing communities across different regions. New indicators for the framework are proposed, with the goal of having them adopted (designed and measured) by economists across numerous communities. As such, the DMR Framework should act as an open-sourced tool for anyone to use. Ideally, it will serve as an aide to facilitate investment, incentives and programmes that lead to the MEI industry's sustainable development at a global level. By applying the framework, various stakeholders in the global MEI system could work together towards the shared global agenda of enhancing digital MEI readiness wherever it is limited and challenged. A vibrant and growing digital MEI industry helps to create a marketplace for ideas, knowledge, commerce and progress at a regional and national level.

A Proposed Framework of Measurement Categories and Indicators

The first step in developing a working and useful framework is to identify and use indicators for measuring digital media readiness (DMR).

The Digital Media Readiness Framework (DMR Framework) organizes relevant indicators into three main categories:

1. **Environment:** Legal, business, education and culture
2. **Capacity:** Infrastructure, accessibility, affordability and skills
3. **Usage:** Government and the private sector

Environment

A community's success in embracing and using digital MEI depends in part on the quality of the overall operating environment. The Environment category therefore assesses the extent to which a community's market conditions, regulatory framework and culture support entrepreneurship, innovation, the development of information and communications technology (ICT), and the use of digital media in general.

The Legal subcategory assesses the extent to which a community's political and regulatory environments facilitate the production and use of digital media. It does so by measuring the extent of protection of intellectual property rights, the prevalence of software and content piracy, the efficiency and independence of the judiciary environment, the efficiency of the law-making process, and the overall quality of regulations pertaining to digital media (including having a legal environment committed to the cause, and allowing for fair involvement for businesses and individuals).

The Business subcategory gauges the business environment's support of entrepreneurship by accounting for bureaucracy, the ease of starting a business, and taxation. It also measures the conditions that allow innovation to flourish, such as availability of technology, the intensity of competition and the availability of venture capital for funding innovation-related projects.

The Education subcategory assesses whether substantial educational programmes, as well as professional training programmes, are available that aim to increase knowledge about and usage of digital MEI. A good education system that focuses on mathematics and sciences serves as a good indicator of the environment's readiness to adopt digital media. This subcategory also assesses the use of the internet in school, as a proxy for the potential benefits associated with the use of ICTs in education.

The Culture subcategory evaluates the overall public knowledge, behaviour and attitude towards creating and using digital media, the adoption of new technologies as well as the entrepreneurial culture. It also takes into account demand conditions for innovative products (as represented by government procuring of advanced technology products).

Capacity

The Capacity category measures the extent to which a community has the infrastructure and other factors in place to support the production and use of digital media. It also considers other factors such as affordability, accessibility and the public's overall skill set (including the digital media literacy rate).

The Infrastructure subcategory captures the state of a community's digital MEI infrastructure, as well as infrastructure that matters for developing ICT: mobile network coverage, international internet bandwidth, secure internet servers, and production of electricity are some of the factors considered.

The Affordability subcategory assesses the ability to pay for digital MEI and new technologies (including ICTs) in a community by measuring the cost of mobile phone usage and broadband internet subscriptions, as well as competition among service providers.

The Accessibility subcategory looks at whether people and businesses have easy access to uncensored, good-quality digital MEI, and relevant products and services.

The Skills subcategory measures the population's capacity to use digital media effectively by accounting for the enrolment rate in secondary education, the public's strength and knowledge in fields related to science and technology, and citizens' overall digital acumen and digital media literacy rate.

Usage

The Usage category assesses the extent to which a society's stakeholders (in government and the private sector) have adopted digital MEI, ICTs and new technologies.

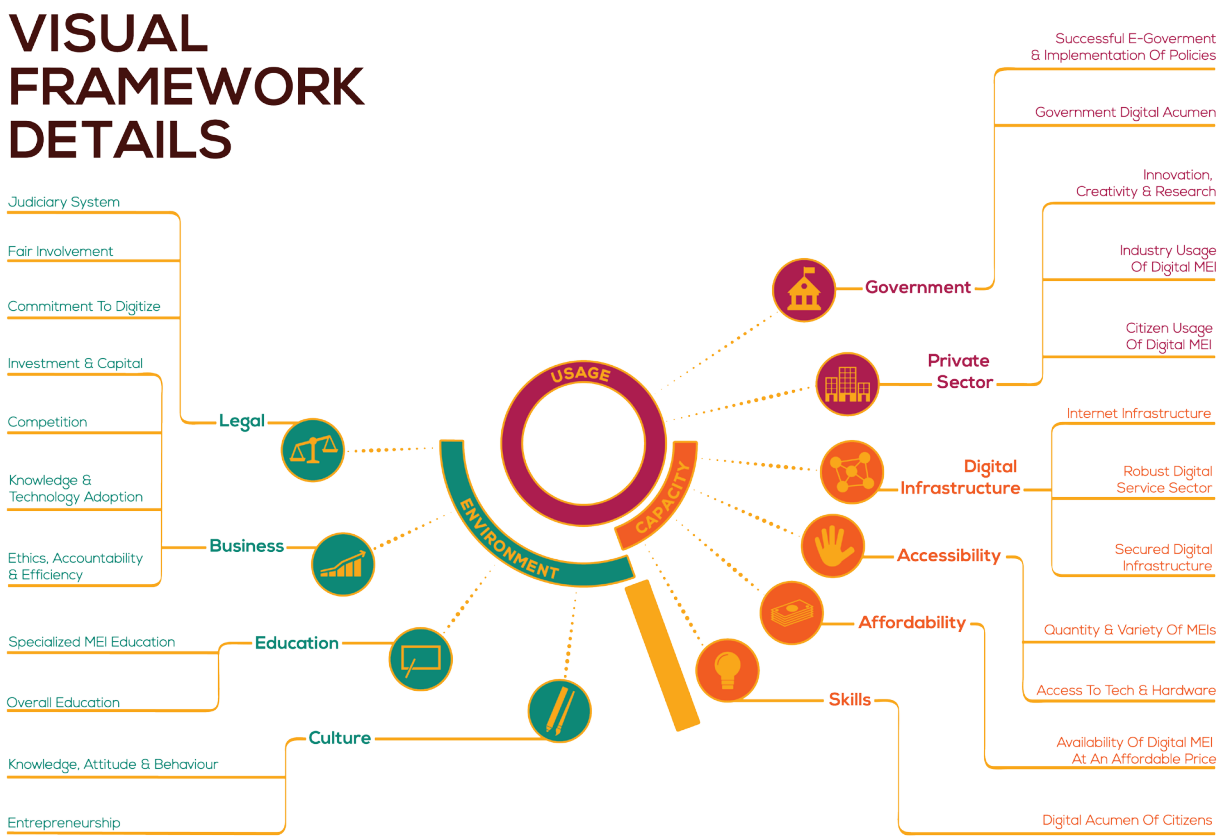
The Government subcategory assesses the government's leadership and success in developing and implementing strategies for the wide and effective use of digital media, for developing ICT and adopting new technologies (e.g. measuring the availability and quality of government online services). In addition, it measures ICTs' impact on government efficiency and the usefulness of information and services provided by a community to engage its citizens in public policy-making through e-government programmes. Finally, it assesses governments' use of digital MEI, as well as ICTs, in conducting and advancing their foreign policies and communication with the global community.

The Private Sector subcategory aims to measure ICTs' effect on the economy and on the development of technological and non-technological innovations in a community. Measurements include the number of copyright applications and the role that ICTs play in developing new products, processes and organizational models, as well as in developing projects (e.g. for public health). This can be split into uses by business and citizens, as in measuring an economy's overall shift towards more knowledge-intensive activities. It takes into account the effects of digital media and new technologies on the work of various non-governmental organizations (NGOs) and businesses to connect with their stakeholders and engage in public relations, as well as on individuals in their daily activities.

Summary of Framework Indicators

Among the subcategories, 23 indicators serve as the relevant measures of DMR (Figure 1):

Figure 1: Digital Media Readiness Framework – Details of Relevant Measures



Source: World Economic Forum, Digital Media Readiness Framework

Environment

a. Legal

1. Judiciary system: regulatory stance and policy-making, including efficiency, independence, roles and responsibilities
2. Fair involvement, including:
   - Enabling environment for independent media: having open and competitive digital media markets
   - Promoting, encouraging and supporting local initiatives in the field: removing barriers to innovation and encouraging local experimentation
   - Ensuring freedom, safety and security: looking at the legal system's efficiency in terms of web security and freedom, and privacy issues
3. Commitment: long-term policies to ensure a thriving and healthy digital MEI industry

b. Business

4. Investment/Capital: the availability of capital for funding innovation-related projects, financial market development, risk assessment and evolution of resource channels
5. Competition: its intensity in the digital realm
6. Knowledge and adopting technology: an economy's overall shift towards more knowledge-intensive activities and investment in the latest and best technologies
7. Ethics, accountability and efficiency

c. Education

8. Specialized MEI education: availability of an education system that encourages creativity and the use of digital media while training the workforce
9. Quality of the education system: overall quality, with special focus on creative industries, education in mathematics and science, and use of the internet and ICTs

d. Culture

10. Knowledge, attitude and behaviour: the public's willingness to embrace digital media, and the level of digital tools' diffusion among a community's population
11. Entrepreneurship culture

Capacity

a. Digital Infrastructure

12. Internet infrastructure: mobile and fixed internet infrastructure
13. Having a robust digital service sector: the required services, including advanced data centre infrastructure management (DCIM)
14. Having a secured digital infrastructure: efficient and advanced cyber- and web security

b. Accessibility

15. Quantity and variety of digital media: availability of digital MEI content, services and platforms
16. Access to digital technology and hardware

c. Affordability

17. Cost of digital MEI

d. Skills

18. Digital acumen of citizens: including their digital media literacy

Usage

a. Government

19. Successful e-governance and implementation of policies: government's success in implementing policies that grow and develop digital MEI
20. Overall digital acumen: government's efficient and advanced use of digital platforms and media tools

b. Private Sector

21. Innovation: technological innovations in the private sector
22. Digital MEI penetration in the private sector: efficient and advanced use of digital media and related ICT for the various business/NGO services provided
23. Citizen usage of digital MEI

Methodology for Identifying and Defining Indicators

The initial research phase consisted of reviewing major reports and indices related to more general "digital readiness". The aggregated data from these sources was then coded to better identify recurring themes. The findings led to a proposed layout of the DMR Framework's indicators.

The information herein is based on aggregating and selecting the most relevant indicators for digital MEI readiness from the various existing indices already published and regularly refreshed with updated data. Such indices include:

- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum)
- E-Intensity Index (World Economic Forum and The Boston Consulting Group, 2013)
- *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014)
- *Expanding Participation and Boosting Growth: The Infrastructure Needs of the Digital Economy* (World Economic Forum, 2015)
- *Measuring the Information Society Report 2014* (International Telecommunication Union [ITU])
- *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014)
- Index on Informed Societies (Global Agenda Council on Informed Societies, World Economic Forum)*
- *State of Connectivity: 2014 – A Report on Global Internet Access* (internet.org)
- Digital Evolution Index (The Fletcher School, Tufts University, 2013)
- Sustainable Governance and Transformation Indices (Bertelsmann Stiftung)

In some cases, the framework provides suggestions for metrics to better measure existing indicators or indicator ideas that are not currently applied and measured in these listed sources. The new indicators, or new metrics for existing ones, are subject to further analysis and review (likely by economists) and include:

- Fundamental aspects of fair involvement
  - Enabling environment for independent media: having open and competitive digital media markets
  - Promoting, encouraging, and supporting local initiatives in the field: removing barriers to innovation and encouraging local experimentation
  - Ensuring freedom, safety and security: looking at the legal system's efficiency regarding web security and freedom, and privacy issues
- Competition: its intensity in the digital realm
- Knowledge, attitude and behaviour: the public's willingness to embrace digital media, and the level of digital tools' diffusion among a community's population
- General entrepreneurial culture
- Having a robust digital service sector: the required services, including advanced DCIM
- Quantity and variety of digital media: availability of digital MEI content, services and platforms
- Digital acumen of citizens: including their digital media literacy
- Innovation: technological innovations in the private sector
- Digital MEI penetration in the private sector: efficient and advanced use of ICT and digital media for the various business/NGO services provided
- Citizen usage of digital MEI

* This Index was partially developed but never completed nor published by the World Economic Forum

Indicator Metrics and Sources

The following symbols are used to mark the metrics taken from previous World Economic Forum indices:

Δ = content associated with the Networked Readiness Index
Δ = content associated with the Global Competitiveness Index 2014-2015
Δ = content associated with the Index on Informed Societies*

Indicators in purple are newly introduced and taken from other non-Forum sources/indices.

* This Index was partially developed but never completed nor published by the World Economic Forum

Environment

Legal

Judiciary System

Regulatory stance and policy-making

OVERVIEW	Efficiency, independence, roles and responsibilities
METRICS	A judiciary system can be evaluated based on the following: 1) ΔΔ Considerations (including adjudicating authority, sufficiency of application, evidentiary standards, format and court order, judicial oversight, investigatory proceedings and emergency procedures) 2) Search process (scope, costs, requests, notifications, data governance, provider transparency, provider responses and challenges) 3) Appeals and remedies 4) Δ Independence 5) Δ Effectiveness of lawmaking bodies 6) Δ Well-developed laws relating to ICTs 7) Δ Number of procedures and days to enforce a contract 8) International cooperation (choice of laws and procedures, authority of response, emergency procedures, safeguards and grounds for refusal) 9) Δ Transparency of government policy-making
SOURCES	- *Universal Implementation Guide for the International Principles on the Application of Human Rights to Communications Surveillance* (https://s3.amazonaws.com/access.3cdn.net/a8c194225f95db00e9_blm6ibrri.pdf) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/) - World Justice Project (http://worldjusticeproject.org/rule-law-around-world) - World Legal Information Institute (http://www.worldlii.org/) - World Bank Indicators (http://data.worldbank.org/indicator/IC.LGL.CRED.XQ) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Fair Involvement

I. Enabling environment for independent media

OVERVIEW	Open, competitive media markets
METRICS	1) Allowing media organizations to self-regulate 2) Having policies that support innovation and investment across the entire ICT value chain 3) Δ Diversion of public funds
SOURCES	- Huawei Global Connectivity Index (http://www.huawei.com/minisite/gci/en/) - Towards a Blueprint for Informed Societies (http://www3.weforum.org/docs/GAC13/WEF_GAC_InformedSocieties_TowardsBlueprintInformedSocieties_Report_2013.pdf) - *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - World Legal Information Institute (http://www.worldlii.org/) - World Bank Indicators (http://data.worldbank.org/indicator/IC.LGL.CRED.XQ) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

II. Promoting, encouraging and supporting local initiatives in the field

OVERVIEW	Removing barriers to innovation and encouraging local experimentation
METRICS	1) Targeted consolidation of digital infrastructure service providers to encourage service-level innovation in markets where fragmentation limits investments 2) ΔΔ Favourable tax environment 3) Level of freedom to establish new enterprise 4) Regulations that encourage stakeholders to pursue cooperative business models to increase use of infrastructure and grow demand for digital services 5) Ease of service-provider fragmentation in digital infrastructure, in regions where fragmentation increases competition
SOURCES	- *Digital Rights and Business: A Primer on Risks and Solutions for the ICT Sector* (Access, 2015) (https://www.accessnow.org/page/-/docs/Digital_Rights_and_Business_Access_1.pdf) - *TeliaSonera's implementation of the Industry Dialogue's Guiding Principles – 2015* (http://www.teliacompany.com/globalassets/telia-company/documents/about-teliasonera/sustainability-report/law-enfo-disc/idtable_march2016_final.pdf) - *Telco Action Plan – Respecting Human Rights: Ten Steps And Implementation Objectives For Telecommunications Companies* (https://s3.amazonaws.com/access.3cdn.net/1f9ab2891a86f3f081_uom6iil1w.pdf) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/) - Towards a Blueprint for Informed Societies (http://www3.weforum.org/docs/GAC13/WEF_GAC_InformedSocieties_TowardsBlueprintInformedSocieties_Report_2013.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

III. Ensuring freedom, safety and security

OVERVIEW	Looking at the legal system's efficiency regarding web security and freedom, and privacy issues
METRICS	1) Regulations ensuring web neutrality 2) ΔΔ Efficiency of intellectual property rights (licensing content/protecting rights) 3) Level of content piracy 4) Efficiency of online privacy rights (e.g. the right to be forgotten) 5) Regulations to ensure data security 6) Adherence to web neutrality rules 7) Level of online freedom/freedom of expression and information 8) Existence of guidelines enabling the efficient flow of data and services 9) Δ Software privacy rate, % of software installed 10) Δ Ranking according to the Freedom on the Net index 11) Δ Reliability of police services 12) Δ Quality of institutions 13) Δ Effectiveness of anti-monopoly policy
SOURCES	- Access (Accessnow.org) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/) - Towards a Blueprint for Informed Societies (http://www3.weforum.org/docs/GAC13/WEF_GAC_InformedSocieties_TowardsBlueprintInformedSocieties_Report_2013.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Commitment

OVERVIEW	Having long-term policies to ensure a thriving and healthy digital media, entertainment, and information (MEI) industry
METRICS	1) Having policies that remove impediments to expanding digital infrastructure 2) Having sustainable and modernized policies (creation and upgrades) 3) Δ Government spending on research and development (R&D) 4) Δ Importance of ICTs to government's vision of the future 5) Δ Ranking in ITU's ICT Development Index 6) Δ Ranking in ITU's Digital Opportunity Index
SOURCE	- *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2014.aspx) - *Digital Planet: Readying for the Rise of the e-Consumer* (The Fletcher School, Tufts University) (http://fletcher.tufts.edu/eBiz/Index) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Business

Investment/Capital

OVERVIEW	The availability of capital for funding innovation-related projects, financial market development, risk assessment and evolution of resource channels
METRICS	1) Number of firms providing funding for tech start-ups or other digital media initiatives, as well as the amount of funds 2) Advertising spend per person (increased ad spend per person equates to more investment in content, platforms and services) 3) Amount of funds per person from institutional investments (private equity) 4) Amount of funds per person from private investments (e.g. crowdfunding) 5) Amount of funds per person from public-sector investments (e.g. government funding) 6) ΔΔ Availability of venture capital 7) Δ Affordability of financial services 8) Δ Ease of access to loans 9) Δ Total tax rate, % profit 10) Δ Number of days to start a business 11) Δ Soundness of banks
SOURCES	- *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - *Global Entertainment and Media Outlook 2015-2019* (PwC) (http://www.pwc.com/gx/en/industries/entertainment-media/outlook/territory-segments-digital-forecast-overview.html#segment) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Competition

OVERVIEW	Competition's intensity in the digital realm
METRICS	1) Δ Intensity of local competition 2) Proportion of money spent in digital MEI and advertising compared to traditional MEI, including advertising 3) Total volume of MEI-related commercial transactions that flow through digital channels 4) Total volume of non MEI-related commercial transactions that flow through digital channels 5) Portion of digital vs non-digital advertising spend (see Group M's worldwide media and marketing forecasts in its publication, *This Year, Next Year*)
SOURCES	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption)

Knowledge and Adopting Technology

OVERVIEW	An economy's overall shift towards more knowledge-intensive activities and investment in the latest and best technologies
METRICS	1) Δ A measure of the investment in new technologies 2) Corporate policies to expand ICT and use of digital MEI 3) ΔΔ Absorbing technology at the firm level 4) Δ University/industry collaboration and investment in R&D 5) Δ Patent applications filed under the Patent Cooperation Treaty, per million people (population)
SOURCES	- *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - *Digital Planet: Readying for the Rise of the e-Consumer* (http://fletcher.tufts.edu/eBiz/Index) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Ethics, Accountability and Efficiency

OVERVIEW	The ethics, accountability and efficiency of private institutions
METRICS	1) Δ Ethical behaviour 2) Δ Strength of auditing and reporting standards 3) Δ Strength of investor protection 4) Δ Efficient use of talent 5) Δ Availability of scientists and engineers
SOURCE	- Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Education

Specialized MEI Education

OVERVIEW	Availability of an education system that encourages creativity and the use of digital media while training the workforce
METRICS	1) Δ Quality of the education system, with special focus on mathematics and science, and use of the internet/ICTs 2) Δ Various training programmes in businesses and governmental agencies for employees to improve their use of digital media 3) Number of specialized arts and creative schools and programmes (creative workforce training) 4) Δ Internet access in schools
SOURCES	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Measuring the Information Society Report 2014* (ITU) (http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2014.aspx) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Quality of the Education System

OVERVIEW	Overall quality of various education institutions, as well as enrolment rates
METRICS	1) ΔΔ Quality of primary education 2) ΔΔ Secondary education enrolment rate 3) ΔΔ Tertiary education enrolment rate 4) ΔΔ Quality of school management
SOURCES	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - *Measuring the Information Society Report 2014* (http://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2014.aspx) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Culture

Knowledge, Attitude and Behaviour

OVERVIEW	The public's willingness to embrace digital media, and the level of digital tools' diffusion among a community's population
METRICS	1) Attitude towards digital MEI compared to traditional MEI 2) Attitude towards digital advertising compared to traditional advertising 3) Social media use and traffic 4) ΔΔ Mobile usage, internet usage and other device usage (e.g. number of connected devices/internet traffic) 5) The general public's views towards online entertainment channels, information content, products and services 6) Demand conditions for the latest technologies and innovative products (as proxied by the development of government procuring of advanced technology products) 7) Time spent using digital media 8) ΔΔ Internet users 9) ΔΔ Internet subscriptions 10) Traffic per internet connection (amount of data used/connection/type of device) 11) ΔΔ Mobile broadband subscriptions 12) Percent of consumer spend in e-commerce vs physical retail 13) Willingness to create content
SOURCES	- *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014)

Entrepreneurship

OVERVIEW	Having the culture to nurture and develop entrepreneurs who focus on digital media offerings
METRICS	1) Number of start-ups focused on digital MEI offerings 2) Number of enterprises creating content 3) Number of businesses distributing digital content 4) Number of total active companies registered in the MEI sector 5) Ratio of bankruptcies to companies registered (used to measure the cultural acceptance of failure)
SOURCE	- Global Entrepreneurship Index (http://thegedi.org/global-entrepreneurship-and-development-index/)

Capacity

Digital Infrastructure

Internet Infrastructure

OVERVIEW	Mobile and fixed internet infrastructure
METRICS	1) Δ Allocation of mobile network coverage; utilizing and harmonizing mobile 2) Δ International internet bandwidth 3) Δ Coverage for private sector, mobile use and adaptation 4) Δ Internet speed (connecting, uploading, downloading, streaming) 5) Δ Production of electricity
SOURCES	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - Pew Research Center, "Internet Seen as Positive Influence on Education but Negative on Morality in Emerging and Developing Nations", 2015 (http://www.pewglobal.org/2015/03/19/internet-seen-as-positive-influence-on-education-but-negative-influence-on-morality-in-emerging-and-developing-nations/)

Having a Robust Digital Service Sector

OVERVIEW	The required services, such as advanced data centre infrastructure management (DCIM) and encompassing software tools and services to manage, optimize and plan for resources in data centres, including information technologies hardware, power, cooling and physical space
METRICS	1) An own cloud/data centre infrastructure 2) A true single digital market, in which data and services can flow across regional borders 3) Compliance with international standards; access to and use of open-sourced software and tech 4) DCIM per total ICT spending (or rating based on DCIM strengths)
SOURCES	- *State of Connectivity: 2014 – A Report on Global Internet Access* (internet.org) (https://fbnewsroomus.files.wordpress.com/2015/02/state-of-connectivity_3.pdf) - *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - *Digital density index: Guiding digital transformation* (Accenture) (https://www.accenture.com/us-en/insight-digital-density-index-guiding-digital-transformation.aspx)

Having a Secured Digital Infrastructure

OVERVIEW	Efficient and advanced cyber- and web security
METRICS	1) Level of web security 2) Δ Secure internet servers per million people (population)
SOURCES	- *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf)

Accessibility

Quantity and Variety of Digital Media

OVERVIEW	Availability of digital media, entertainment and information (MEI) content, services and platforms
METRICS	1) Providing digital content for the public (variety of platforms, services and content) 2) Quantity of platforms and services 3) Providing information and services to engage citizens in public policy-making through e-government programmes 4) Number of businesses/entities offering services on digital platforms 5) Uncensored access to social media platforms, content distribution channels, advertising, communications and marketing services 6) Creation/development of original digital media content (local language, foreign language) 7) Availability of transactional on-demand, advertising-funded and subscription-based consumption models 8) Availability of transactional models (advertising funded and subscription based) 9) The volume of available MEI-specific apps
SOURCES	- *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf)

Access to Digital Technology and Hardware

OVERVIEW	Availability of/easy access to technology, devices and technological services
METRICS	1) Level of hi-tech devices available to citizens 2) Availability of advanced ICT services 3) Access to local/international cloud infrastructure 4) Access to regional and international markets 5) ΔΔ Government procurement of latest technologies 6) ΔΔ Availability of latest technologies
SOURCES	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - Global Competitiveness Index 2014-2015 (http://knoema.com/WFGCI2014/the-global-competitiveness-index-2014-2015-data-platform-2014) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - *Digital density index: Guiding digital transformation* (Accenture) (https://www.accenture.com/us-en/insight-digital-density-index-guiding-digital-transformation.aspx)

Affordability

Cost of Digital MEI

OVERVIEW	Availability of digital media, entertainment, and information (MEI) at an affordable price for citizens and businesses
METRICS	1) Cost of having access to MEI content, platforms and services compared to gross domestic product 2) Δ Internet subscription fees (fibre to the home, mobile, 3G, broadband) 3) Mobile data usage costs 4) Δ Competition among service providers 5) Mobile SIMs per subscriber 6) Megabytes of data consumed per month 7) Availability of zero-rated data for MEI services, platforms and content 8) Ranking based on the Big Mac Index concept
SOURCES	- *State of Connectivity: 2014 – A Report on Global Internet Access* (internet.org) (https://fbnewsroomus.files.wordpress.com/2015/02/state-of-connectivity_3.pdf) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014 (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - *Digital density index: Guiding digital transformation* (Accenture) (https://www.accenture.com/us-en/insight-digital-density-index-guiding-digital-transformation.aspx) - "The Big Mac Index" (http://www.economist.com/content/big-mac-index)

Skills

Digital Acumen of Citizens

OVERVIEW	A measure of citizens' general talent in applying digital media, including the inclination to understand, use and apply digital technologies in everyday life
METRICS	1) Measure of the public's basic ICT skills (e.g. proficiency in managing digital information required by a modern academic and economic environment) 2) Digital media literacy rate (e.g. knowing how to use social media, being able to assess and verify digital content and sources, and to distinguish between different types of content) 3) High levels of education, especially in scientific and engineering disciplines 4) Extent of staff training as a proxy for the capacity of management and staff to effectively use ICT and digital platforms 5) Size of domestic ICT workforce (developers and IT workforce per person) 6) Literacy rate for ability to create content 7) Advanced ICT skills, such as using virtual private networks and private network-attached storage, downloading torrents and setting up networked content ecosystems
SOURCES	- Huawei Global Connectivity Index (http://www.huawei.com/minisite/gci/en/) - *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf)

Usage

Government

Successful E-Governance and Implementation of Policies

OVERVIEW	Government's success in implementing policies that grow and develop digital media, entertainment, and information (MEI)
METRICS	1) Government offering digital services (e-governance) 2) Public's use of online platforms, including social media platforms, to connect with the government/ government officials and influence policy design 3) Creating a ranking based on stages of e-government evolution (emerging, enhanced, interactive, transactional and networked) 4) Δ Government success in promoting ICT 5) Δ Impact of ICTs on access to basic services
SOURCES	- *United Nations E-Government Survey 2014*, Department of Economic and Social Affairs (http://unpan3.un.org/egovkb/Portals/egovkb/Documents/un/2014-Survey/E-Gov_Complete_Survey-2014.pdf) - *Global E-Government Readiness Report 2004*, United Nations (http://unpan3.un.org/egovkb/Portals/egovkb/Documents/un/2004-Survey/Complete-Survey.pdf) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf)

Overall Digital Acumen

OVERVIEW	Government's efficient and advanced use of digital platforms and media tools
METRICS	1) Δ Government having strong and efficient digital presence to connect with the domestic and foreign public 2) Δ Government Online Service Index
SOURCE	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf)

Private Sector

Innovation

OVERVIEW	Technological innovations in the private sector, as well as academic research and literature
METRICS	1) Number of copyright applications per person 2) Creating knowledge: patents at domestic and international level; MEI-specific published articles in peer-reviewed journals 3) Knowledge with impact on digital MEI: business creation, investment and improvements 4) Knowledge diffusion 5) Intangible assets: trademarks at domestic and international level (Madrid system) 6) Creative digital MEI goods and services: digital MEI service exports 7) Δ Impact of ICTs on new organizational models
SOURCES	- *Global Internet Report 2015* (Internet Society) (http://www.internetsociety.org/globalinternetreport/assets/download/IS_web.pdf) - OECD.Stat (Organisation for Economic Co-operation and Development) (http://stats.oecd.org/) - The Global Innovation Index 2015 (Cornell University, INSEAD and the World Intellectual Property Organization [WIPO]) (https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf) - Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - Patent Cooperation Treaty Yearly Review (WIPO, 2015) (http://www.wipo.int/edocs/pubdocs/en/wipo_pub_901_2015.pdf)

Digital MEI Penetration in the Private Sector

OVERVIEW	Efficient and advanced use of digital media and related ICT for various business/NGO services provided , such as e-commerce and monetization plans
METRICS	1) Percentage of companies doing business online (the extent to which businesses in a community use the internet for business-to-business and business-to-consumer operations) 2) Businesses having efficient customer service via digital channels 3) Use of digital media to connect with stakeholders and target audiences 4) Digital creativity: the number of digital MEI-related top-level domains, monthly edits on Wikipedia, uploads on YouTube, blog postings and online gaming 5) Δ Employment in knowledge-intensive activities (proportion of workforce)
SOURCES	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf) - *Global Internet Report 2015* (Internet Society), http://www.internetsociety.org/globalinternetreport/assets/download/IS_web.pdf - E-Intensity Index (World Economic Forum and The Boston Consulting Group) (https://www.bcgperspectives.com/content/interactive/telecommunications_media_entertainment_bcg_e_intensity_index/) - *Offline and falling behind: Barriers to Internet adoption* (McKinsey & Company, 2014) (http://www.mckinsey.com/insights/high_tech_telecoms_internet/offline_and_falling_behind_barriers_to_internet_adoption) - *Delivering Digital Infrastructure: Advancing the Internet Economy* (World Economic Forum, 2014) (http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf) - *Measuring the Information Society Report 2014* (ITU) (https://www.itu.int/en/ITUD/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf) - *Digital density index: Guiding digital transformation* (Accenture) (https://www.accenture.com/us-en/insight-digital-density-index-guiding-digital-transformation.aspx) - *Global Entertainment and Media Outlook 2015-2019* (PwC) (http://www.pwc.com/gx/en/industries/entertainment-media/outlook/territory-segments-digital-forecast-overview.html#segment)

Citizen Usage of Digital MEI

OVERVIEW	Individuals' use of digital media, entertainment, and information (MEI)
METRICS	1) Number of active social media accounts, per person 2) Amount of time spent on social media, per person 3) Number of active digital content service accounts, per person (video, music, news and other information) 4) Amount of time consuming digital content, per person 5) The public's use of social media platforms to connect with businesses 6) Number of relevant apps downloaded 7) Systematic use of the internet and mobile apps to disseminate and/or gather information 8) Δ Creation of a ranking based on the E-Participation Index (a supplementary index to the United Nations E-Government Survey)
SOURCE	- Networked Readiness Index (*The Global Information Technology Report 2015*, World Economic Forum) (http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf)

Identifying Gaps and Future Steps

From the preceding analysis, gap areas in research can be highlighted, with colour used for the indicators of each subcategory. Content in yellow, with a number of metrics designed by the World Economic Forum, could benefit from developing the metrics even further. Content in green is rich in being associated with metrics designed previously by the Forum. Indicators in red need the most research and more metrics.

Environment

a. Legal

1. Judiciary system: regulatory stance and policy-making, including efficiency, independence, roles and responsibilities
2. Fair involvement, including:
   a. Enabling environment for independent media: having open and competitive digital media markets
   b. Promoting, encouraging and supporting local initiatives in the field: removing barriers to innovation and encouraging local experimentation
   c. Ensuring freedom, safety and security: looking at the legal system's efficiency in terms of web security and freedom, and privacy issues
3. Commitment: long-term policies to ensure a thriving and healthy digital MEI industry

b. Business

4. Investment/Capital: the availability of capital for funding innovation-related projects, financial market development, risk assessment and evolution of resource channels
5. Competition: its intensity in the digital realm
6. Knowledge and adopting technology: an economy's overall shift towards more knowledge-intensive activities and investment in the latest and best technologies
7. Ethics, accountability and efficiency

c. Education

8. Specialized MEI education: availability of an education system that encourages creativity and the use of digital media while training the workforce
9. Quality of the education system: overall quality, with special focus on creative industries, education in mathematics and science, and use of the internet and ICTs

d. Culture

10. Knowledge, attitude and behaviour: the public's willingness to embrace digital media, and the level of digital tools' diffusion among a community's population
11. Entrepreneurship culture

Capacity

a. Digital Infrastructure

12. Internet infrastructure: mobile and fixed internet infrastructure
13. Having a robust digital service sector: the required services, including advanced DCIM
14. Having a secured digital infrastructure: efficient and advanced cyber- and web security

b. Accessibility

15. Quantity and variety of digital media: availability of digital MEI content, services and platforms
16. Access to digital technology and hardware

c. Affordability

17. Cost of digital MEI

d. Skills

18. Digital acumen of citizens: including their digital media literacy

Usage

a. Government

19. Successful e-governance and implementation of policies: government's success in implementing policies that grow and develop digital MEI
20. Overall digital acumen: government's efficient and advanced use of digital platforms and media tools

b. Private Sector

21. Innovation: technological innovations in the private sector
22. Digital MEI penetration in the private sector: efficient and advanced use of digital media and related ICT for the various business/NGO services provided
23. Citizen usage of digital MEI

The Framework

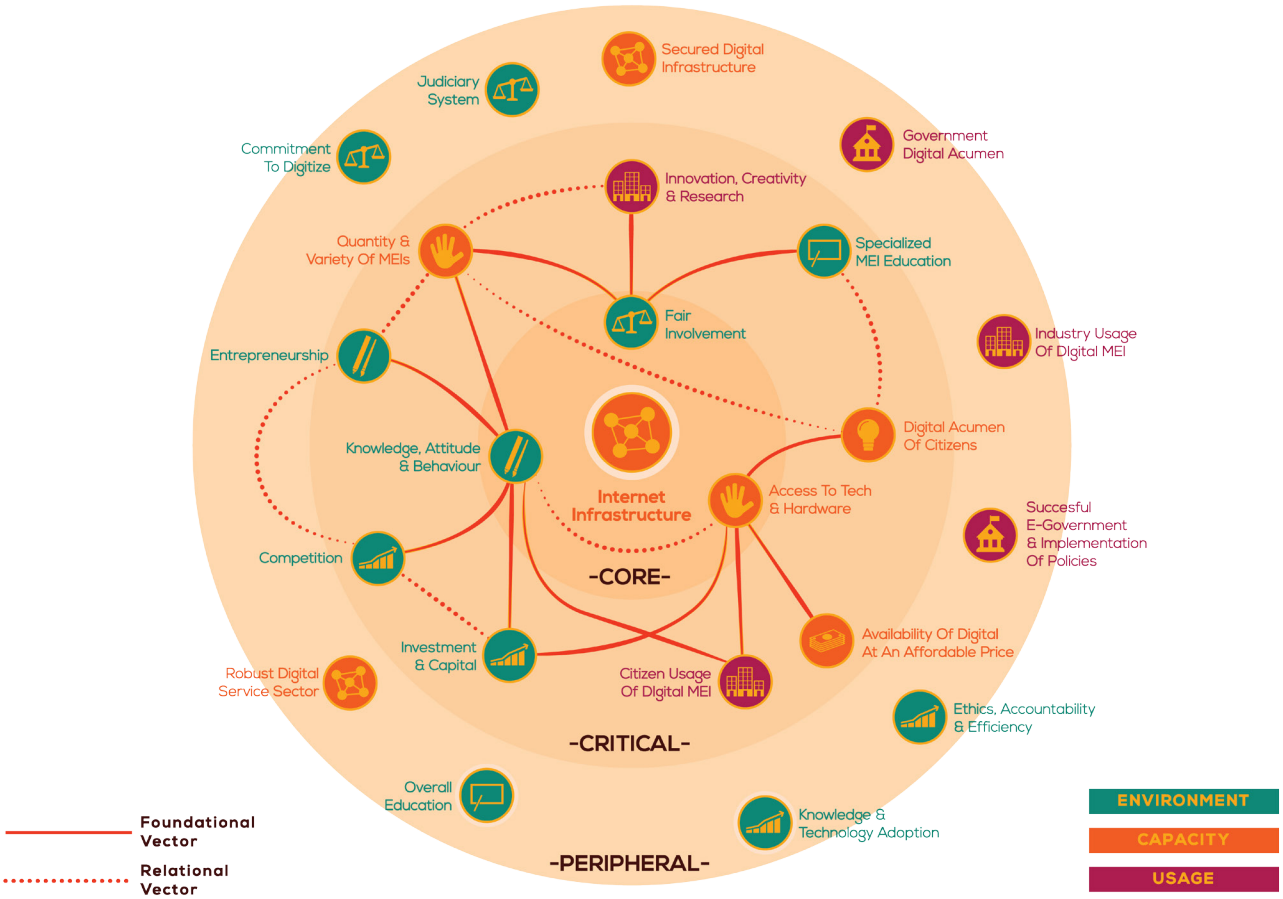
While 23 main indicators were selected or defined for measuring DMR, many of them already exist or are significantly influenced by other indicators. Interdependencies and the relative importance of each indicator influence overall DMR. A framework (Figure 2) can visually map and structure this relationship between indicators.

Relative weighting of indicators within the framework

Three circles of influence define the importance or weight of indicators: **core, critical,** and **peripheral**.

- Indicators in the **core** are fundamental to DMR; they must be adopted to some extent for any level of DMR to exist. Indicators closer to the centre are more fundamental. For example, internet Infrastructure is essential for an environment to adopt any digital media service, platform or content.
- Good levels of **critical** indicators are important, but not essential, for good DMR.
- Some level of **peripheral** indicators help with DMR and are present in the world's most digital-media-ready environments, which are mainly attributed to advanced economies.

Figure 2: Framework – Circles of Influence and Relationships between Indicators



Source: World Economic Forum, Digital Media Readiness Framework

Relationships and linkages within the framework

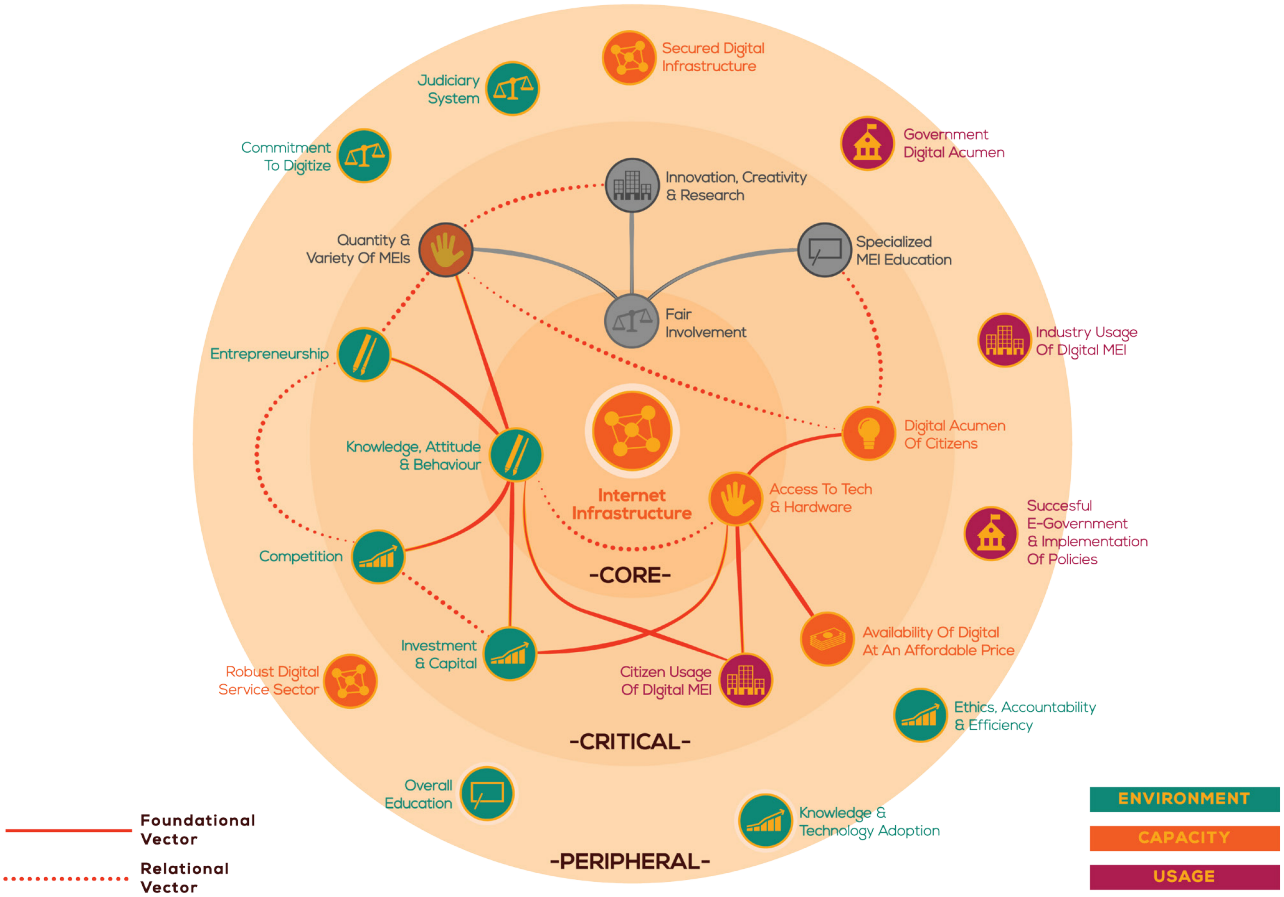
Two main vectors – **foundational** and **relational** – define the interdependencies between indicators:

Foundational vectors define strong links between indicators. For example, absence in *Fair Involvement* automatically produces an absence in (i) *Quantity and Variety of MEI,* (ii) *Innovation, Creativity and Research*, and (iii) *Specialized MEI Education.*

Relational vectors show indicators that are interconnected but less dependent on each other. For example, (i) *Investment and Capital, (ii) Competition* and (iii) *Entrepreneurship* are linked indicators, but are also mutually exclusive.

All DMR indicators are affected by issues and lower performing metrics of indicators closer to the core. Both the distance to the centre of the framework and the number of each indicator's vectors define an indicator's importance. Three indicators are critical: *Fair Involvement; Access to Tech and Hardware; and Knowledge, Attitude and Behaviour.* The absence of any two of these would significantly reduce DMR (as shown by one example in Figure 3).

Figure 3: Absence of Indicators Can Significantly Reduce Digital Media Readiness



Source: World Economic Forum, Digital Media Readiness Framework

Eliminating *Fair Involvement* would severely disrupt a community's (i) *Quality and Variety of MEI,* (ii) *Innovation, Creativity and Research,* and (iii) *Specialized MEI Education.* Only the quality and variety of MEI could continue to evolve, since the knowledge, attitude and behaviour cultural indicator fundamentally supports it.

Best Practices of Digital Media Readiness

Brief case studies demonstrate how applying the framework to real-world examples has improved or can improve DMR.

The Digital Textbook (Japan)

Context

Better educating citizens for a more hyperconnected society has become a main aspect of Japanese education reform. Recent policies stemming from this educational reform include digitizing textbooks and supplementary teaching materials provided by formal education for primary and secondary schools.

On 14 June 2013, the Japanese government officially announced the "Declaration to be the World's Most Advanced IT Nation", a policy to deploy digital textbooks for use by students via ICT terminals in every primary and secondary school by 2020.

Prior conditions (before the change/innovation)

Paper/print is the government-authorized and prevalent format for educational materials in primary and secondary schools across Japan. Supplementary learning materials can appear in media-based formats, which more recently have included ICTs such as online applications, content production and sharing. However, the government did not mandate these formats.

Post conditions (after the change/innovation)

To implement the 2013 policy, the law on the format of educational materials required revision so that digital textbooks would become the new authorized and official government-backed format. After getting final consensus, the Japanese government decided to advance the policy on 9 May 2016, taking the necessary action during its 2016 fiscal year. The Intellectual Property Strategy Program 2016 includes this decision and change.

Link to DMR framework indicators

This ongoing initiative will help improve the following indicators: (i) *Citizen Usage of Digital MEI* (private sector), (ii) *Digital Acumen of Citizens* (skills), (iii) *Commitment to Digitize* (legal) and (iv) *Access to Tech and Hardware* (accessibility).

- **Environment: Legal, business, education and culture**
  While the example reflects the clear progress of the *Commitment to Digitize,* this indicator is not the most important one. The government has taken a significant step towards creating an environment that stimulates *Investment and Capital* from business, a more critical indicator impacting DMR. Additionally, greater use of digitized content, particularly for educational purposes, will grow digital media-related *Knowledge, Attitude and Behaviour* among Japanese students (a DMR indicator closer to the framework's core).
- **Capacity: Infrastructure, accessibility, affordability and skills**
  Citizens need the right devices to access digital content. A change in government policy to make digitized textbooks the norm for the education system will profoundly impact citizens' *Access to Tech and Hardware*. Additionally, use of digitized textbooks will only increase the *Digital Acumen of Citizens* in Japan. All of these are critical indicators of heightened DMR.
- **Usage: Government and the private sector/non-government**
  The new Japanese policy should have a direct impact on *Citizen Usage of Digital MEI* because educational material is considered as "information", and its digitized state has become an advanced medium for consumption. Primary and secondary education systems with digital textbooks as the government-supported and recommended format will lead to high levels of digital MEI usage among a society's citizens.

The City of Chattanooga, Tennessee (USA)

Context

With a diverse population of around 450,000 people from around the world, Chattanooga is relatively small. Nevertheless, it lies close to cities with a total of 12 million people, including Atlanta as the closest large hub (1.5 hours by car, 20 minutes by plane).

Like much of Chattanooga's urban landscape, the city's electric grid had not been updated for decades. In the late 1990s, the Electric Power Board (EPB), Chattanooga's publicly owned electric power system, began planning a massive upgrade. By September 2009, it started serving its first residential internet customers. The fibre network it installed allows for "Gig" service that supports the most advanced smart grid system in the United States. Chattanooga became the first US city to offer 10-gigabit-per-second fibre internet service to all residents and businesses. Hundreds of times faster than the national average speed, the Gig opened the door to unimagined ways of learning, playing and conducting business.

Prior conditions (before the change/innovation)

Chattanooga's most shameful moment may have been in October 1969, when TV newscaster Walter Cronkite told

viewers that Chattanooga was "the dirtiest city in America". The mountains surrounding the city trapped industrial emissions in the valley; and, like much of Chattanooga's urban landscape, the city's electric grid had not been updated for decades.

In the late 1990s, the EPB's plan for a massive upgrade included the latest smart technology. Specialized computers could help reduce power outages by rerouting electricity problems around trouble spots. EPB researchers and officials realized that it would be easy to piggyback a publicly accessible internet network on the fibre-optic grid that they needed to build anyway.

Post conditions (after the change/innovation)

Over the last five years, Chattanooga has benefited from a conservatively estimated $500-600 million capital injection. The EPB's fibre infrastructure alone cost $220 million and has returned $865 million in financial benefits to the city. Determining what counts as an investment in the technology sector proves difficult, given not just the obvious direct investment, but all the soft investment as well. Nevertheless, local government support has clearly been an incredible transformative force.

According to the local chamber of commerce's most conservative count, the fibre network helped to create over 1,000 jobs, and more than 90 start-ups have launched in, relocated to or expanded in Chattanooga explicitly because of the network. Today, the city serves as the location for headquarters of the Lamp Post Group (an early-stage fund founded by prominent local businessman Ted Alling and his partners), the Chattanooga Renaissance Fund and The JumpFund, a fund with only female investors that invests in female entrepreneurs. The Volkswagen Group and Amazon have set up regional headquarters in the city, providing employment opportunities in both traditional industry and the digital economy.

Link to DMR Framework indicators

Without doubt, Chattanooga serves as a role model for demonstrating how investment in technological infrastructure, with the perfect balance of private- and public-sector support, can transform a city into a world-leading destination for millennials and their modern lifestyle. In applying the World Economic Forum's DMR Framework concept to this example, the different framework indicators can serve to measure the impactful change.

- **Environment: Legal, business, education and culture**
  Chattanooga's evolution – or rather, transformation – to the status of a digital city "poster child" did not happen overnight. However, one of the main reasons for such an expedited change (in just 5-6 years) has been the local government's active endorsement and the support of Mayor Andy Burke, graduate of Stanford University (USA) and a strong believer in the digital ecosystem. Ted Alling, who has invested over $40 million in Chattanooga start-ups over the last three to four years, has been an absolute anchor of the transformation.
- **Capacity: Infrastructure, accessibility, affordability and skills**
  Today, 65,000 homes and 5,000 businesses in Chattanooga get their internet access through EPB. The highest speed – 1 gigabit per second – costs $69.99 per month. Small businesses, however, can access subsidies and even receive free internet access through one of the business accelerators that have helped to launch dozens of companies and lure many more firms to Chattanooga over the past several years.
- **Usage: Government and private sector/non-government**
  The mayor created Innovation District, an area in city's downtown set up to focus on digital businesses and innovative companies. This would create not only employment opportunities, but also entrepreneurship around a digital economy and infrastructure unparalleled in the US and most of the world.

Key figures and statistics:

- **Available venture capital funds in Chattanooga:** $50 million (rough estimate)
- **Federal grant for EPB fibre infrastructure (under the American Recovery and Reinvestment Act of 2009):** $111 million
- **Bonded investment into EPB fibre infrastructure (local and state money):** $109 million
- **Amount of external funding received by the top sixteen start-up firms:** $48 million (since 2010)
- **Volkswagen's investment:** $1 billion (as of 2015)

National Digital Strategy Coordination (Mexico)

Context

The Mexican government will implement the National Digital Strategy over the next five years to encourage the adoption and development of ICTs. This initiative, included in the National Development Plan 2013-2018, also links the country to the global information and knowledge society.

The strategy sets out the challenges Mexico faces in the digital context, and the way it will cope with them, through five major objectives:

1. Transform government by improving its relationship with society
2. Provide for universal, effective health (e.g. services) through a digital health policy
3. Improve the quality of education by integrating ICTs
4. Develop the digital economy to stimulate growth, productivity and job creation
5. Improve public safety via the use of ICTs

The strategy mainly seeks to maximize the economic, social and political impact on Mexicans' quality of life from adopting and using ICTs.

Prior conditions (before the change/innovation)

Mexico ranked last in a "digitization index" applied across OECD countries in 2012, and fifth within the group of Latin American countries. This situation led to the creation of the National Digital Strategy, an international consulting firm, in the same year (according to Telecom Advisory Services).

Initially, the strategy had two goals: to achieve the average score of OECD countries in the digitization index by 2018, as established in the Program for a Close, Modern Government; and to achieve the same status as the leading Latin American country (Chile, at the time) by 2018.

Post conditions (three years after the National Digital Strategy)

As indicated in Mexico's Third Report of Government, official data shows that "the advances in open data of the Mexican Government contributed to Mexico achieving tenth place within the OECD's 'OurData Index', and positioning itself in first place across Latin America. Additionally, Mexico achieved above average ranking within the OECD countries group".

The strategy proposed five key enablers to achieve each of its objectives:

1. Connectivity
2. Digital inclusion and skills
3. Interoperability
4. Legal framework
5. Open data

These are the same enablers preset with some of the proposed DMR Framework indicators and metrics.

Link to DMR Framework indicators

The framework's variables and metrics can help to measure the impact of the National Digital Strategy´s work (advances and challenges):

- **Environment: Business and education**
  - Business subcategory: In e-commerce, the traditional companies are barely investing and conducting research after Amazon's arrival.
  - Education subcategory: The last governments made the great mistake of distributing tablets and devices, instead of establishing effective education policies. The Mexican government still faces the challenge of coordinating the implementation of the National Digital Strategy and more effectively reflecting the strategy's positive impacts, in order to provide digital educational material that goes beyond being a "tool" and proves useful to citizens. In addition, the government still has much to accomplish on training the labour force.
- **Usage: Government and private sector/non-government**
  - *Government Digital Acumen:* The SAT (Fiscal Administration Bureau) offers many services. Moreover, the presidency is considering to connect 250,000 government-related websites between itself and the Mexican population by 2018 (66,000 websites currently exist).
  - *Successful E-Government:* While people in Mexico commonly use social media for private reasons, it is still not driven by the government.
  - *Citizen Usage of Digital MEI:* Mexico ranks 5th worldwide in the number of social media accounts per person, and 3rd in YouTube consumption.

This group of indicators is the most applicable and tangible for the National Digital Strategy´s work.

M-Pesa (Kenya)

Context

Prior to 2007, Kenya was a relatively unbanked country, with financial exclusion common before the launch of M-Pesa. Inaccessible in remote areas, banks had done little to bring financial services to rural dwellers, and opening a bank account had stringent requirements.

As a result, Kenyans began developing an informal system of transferring mobile airtime as a proxy for money. This enabled informal trade, transfers of money to rural villages and a number of applications. Researchers in the United Kingdom's Department for International Development (DFID) noticed this and facilitated a connection with mobile service provider Vodafone, which helped to develop and launch M-Pesa in April 2007 through a DFID Challenge Fund and its own matching investment of £1 million.

M-Pesa ("M" for mobile, "pesa" [Swahili] for money) is Vodafone's mobile phone-based money transfer, financing and microfinancing service for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania. It has since expanded to Afghanistan, South Africa and India, as well as Romania (2014) and Albania (2015). M-Pesa allows users to easily deposit, withdraw and transfer money, and pay for goods and services, with a mobile device. Users can deposit money into an account stored on their mobile phones, send balances using PIN-secured SMS text messages to other users (including sellers of goods and services), and redeem deposits for regular money. The service charges a small fee to users for sending and withdrawing money.

A branchless banking service, M-Pesa allows customers to deposit and withdraw money from a network of agents that includes airtime resellers and retail outlets acting as banking agents. M-Pesa grew quickly, and by 2010 it became the most successful mobile phone-based financial service in the developing world. To date, about 20 million M-Pesa accounts have been registered in Kenya.

Prior conditions (before the change/innovation)

Before M-Pesa's introduction in the Kenyan economy, only physical channels and traditional banking systems provided banking services. This proved prohibitive for a large portion of the population because of the informal nature of both trade and parts of the economy.

Feature phones gained traction because of strong adoption, GSM was pervasive, and mobile became the most common and available platform. Explosive growth of access to mobile phones in Kenya (and the developing world) have contributed to M-Pesa's success. One view holds that not only did the rapid spread of mobile phones help to enable the service, but the service itself, through its corollary and attendant network effect, stimulated the adoption and use of mobile phones.

Post conditions (after the change/innovation)

Nearly a decade after its launch, M-Pesa has transformed economic interaction in Kenya. Its success reshaped the country's banking and telecom sectors, extended financial inclusion for 20 million Kenyans and facilitated the creation of small businesses. In the context of DMR, M-Pesa stimulated the "migration" of the general population to digital and information services. Adoption of phones with digital features has exploded, and trust in digital channels has increased.

Kenya's entertainment and media market grew at over 21% yearly in 2010-2013, and the industry will grow at a forecasted compound annual growth rate of 12.9% to 2019. According to PwC's Global Entertainment and Media Outlook 2015-2019, revenue from internet access will contribute most to this growth and should increase at a 20.4% CAGR in 2015-2019. In fact, Kenya's is the second-fastest growth rate of any country during this period in the PwC survey.

Link to DMR Framework indicators

Several framework indicators are impacted:

- At the core – naturally, *Internet Infrastructure* (associated with GSM)
- In the critical circle of influence – *Knowledge, Attitude and Behaviour; Citizen Usage of Digital Media; Cost of Digital MEI (affordability); Quantity and Variety of MEI;* and *Access to Tech and Hardware,* together with *Digital Acumen of Citizens* and *Entrepreneurship*

The service has been lauded for giving millions of people access to the formal financial system and reducing crime in an otherwise largely cash-based society. It empowers individuals and supports entrepreneurial creativity in a less constrained financial marketplace. The impressive uptake and growth rates of internet access and smartphone adoption, as well as the continued reliance on mobile and digital services, clearly point to the improvement in DMR. In addition, Kenya's regulatory environment has enabled innovation and the growth of connectivity and digital services. This progressive attitude also pervades other departments to enable DMR and assist in adopting advanced media products.

A groundbreaking option for transferring money, M-Pesa also became a service that common Kenyans could embrace. It demonstrated the potential of mobile phones, as well as digital and other flexible, adaptable technologies on the continent. The platform's success and the trust it engendered led to its becoming a precursor of adopting more content-enriched digital media services for public consumption.

Today, Kenya has a strong posture towards digital readiness, largely reinforced by M-Pesa's success and the related social and economic benefits. The progressive approach towards digital services taken by the Kenyan government and regulators has led the country to becoming one of the most advanced digital economies in Africa. M-Pesa had a contributing role to play in this development, being a forerunner to other value-added services and MEI-type offers.

Xikang (China)

Context

Delivering quality healthcare solutions to China's population of almost 1.4 billion seems like an almost insurmountable task. The country has too few independent general practitioners (family physicians) to serve this large population; as a result, people in cities tend to queue sometimes for hours in hospital lobbies to register and obtain a doctor's appointment. Urban communities and rural areas suffer from a scarcity of medical services, and patients there do not trust doctors, who are disconnected from big hospitals and have limited service capabilities.

Once the government implements the national healthcare insurance plan covering every citizen, China will face a significant challenge with poor-quality community and home-care services. Neusoft Corporation, a leading provider of high-end medical equipment and services, as well as information technology (IT) solutions and services in China (and a Member of the World Economic Forum), launched a public-private partnership and established the Xikang company to bring ubiquitous health management and cloud hospital services to a broad range of China's population. This especially covered the community healthcare centres in urban and rural areas that lack enough healthcare service capability.

Neusoft Corporation describes the Xikang platform on its website as follows:

> *Xikang is an innovative health management and cloud hospital platform built upon integrated healthcare monitoring equipments, designed to provide professional, high-quality health management & services for individuals, families and communities. This is done by seamlessly connecting healthcare services provided by regional medical centers/ community health service institutions and individual/family dynamic healthcare management with data archiving systems of health monitoring and management institutions. Xikang not only makes premium medical resources available by offering real-time, convenient services to communities, families and individuals who pursue high-quality life, but also helps establish a scientific and systemic networking management platform for hospitals and health administrative departments, thus creating an easy path for healthcare development and making optimum use of the healthcare investment.*

The Global Agenda Council on the Future of Media, Entertainment & Information summarizes Xikang's objectives and endeavours as:

- Build a collaborative healthcare platform to enhance the service capabilities of community healthcare centres and their doctors
- Establish a big data healthcare platform with individual health archives for citizens, updated in real time
- Promote the upgrading of medical services in China, from clinical treatment to health management
- Enable a full range of healthcare systems by using its model of healthcare monitoring at home, curing minor illnesses at community medical centres, and treating serious illnesses at hospitals

Prior conditions (before the change/innovation):

People seeking care in major hospitals in Chinese cities would have long waits. In many countries, including the Unites States, primary care and treatment of simple ailments often occur in hospitals rather than outside the hospital setting. Moreover, the one medical practitioner in certain rural areas might not have medical training. In some cases, rural medicine was practiced without a medical degree and often without even a college education.

Post conditions (after the change/innovation):

The Xikang initiative initially intended to build a cloud hospital using a sharing platform, similar to the Uber model, for doctors from hospitals and clinics, and even for individual doctors. Xikang can share medical devices, medical IT, wearable healthcare devices, and the clinical pathway and standard process of care among hospitals, clinics and doctors. All medical records are connected, put on the cloud and thereby shared with upper-layer hospitals, community clinics and home-care doctors for better service; in addition, personal healthcare records are being built. Meanwhile, the big data can be analysed for disease prevention. Thus, the quality of healthcare delivery should dramatically improve. Government institutions,

insurance companies and hospitals become partners of Xikang in order to reduce healthcare costs and improve service quality.

Many Chinese cities have deployed the Xikang platform and associated technologies, which have become important infrastructure for creating efficient primary care services that benefit from the expertise and affiliation with hospital staffs and resources. Xikang integrates the most useful resources of regional medical centres and community healthcare facilities through the combination of digital medical devices, health-related Internet of Things, health cloud platforms and outstanding medical resources. It is oriented to provide families and individuals with full life-cycle healthcare services that also include a chronic disease prevention ecosystem. In the most remote areas, Xikang Healthcare Terminal, a portable monitoring device, can measure various basic health data of patients in rural communities. In addition, wearable health and fitness monitoring devices assist with making patient healthcare assessments and providing healthcare services.

By using the integrated platform with internet-connected, technology-enabled diagnostic and monitoring tools, individuals, families and communities, even in remote areas of China, can be connected to skilled physicians at hospitals in urban centres, which can impact healthcare quality and outcomes. In urban settings, the Xikang platform can connect community health centres to hospital medical centres, thus reaching a broader population at lower cost. Additional benefits include the comprehensive collection of personal healthcare data, both on a record-keeping basis and for the benefit of diagnosing and epidemiological tracking of disease vectors. The Xikang service has operated in rural areas, cities and business enterprises, and on a concierge basis for VIP clients.

Neusoft Corporation's Healthy City and Healthy Community programmes operate in 20 Chinese cities. The Service Network covers over 10,000 urban and rural community healthcare centres encompassing a population of more than 30 million. In March 2015, the Ningbo Cloud Hospital in East China's Zhejiang province became the country's first "cloud hospital", an open platform offering community doctors the benefit of connecting with major hospitals, primary healthcare institutions, specialists and third-party organizations. The latter includes pharmacies and insurance companies that can access the platform for collaboration. Patients no longer have excruciatingly long commutes to the affiliated hospitals, receiving high-quality care through the technology used at Ningbo Cloud Hospital.

In addition, the cloud-based information system leverages knowledge across the whole healthcare spectrum of diagnosis, treatment and, it is hoped, preventive medicine. The platform connects to an offline system of medical centres for imaging, clinical testing, remote diagnosis, and health education and training. A dynamic health record is built for each citizen in Ningbo; the Cloud Hospital app on mobile phones can check the health data and also serve as a self-health-management tool. Moreover, wearable health devices can access and manage the data related to users' daily physiological indicators, lifestyle and other health and behavioural aspects.

Ningbo Cloud Hospital has connected with over 100 healthcare organizations and more than 500 doctors and family physicians. In addition, 15 Cloud Diagnosis Rooms exist online for hypertension, diabetes, psychological consultation and general practitioners. The hospital has linked with local pharmacies and third-party organizations so that prescriptions given by "cloud doctors" online can be transmitted to local pharmacies located near patients. Currently, the hospital is actively exploring the home nursing service model; 1,500 nurses have applied for the certificate, and 566 nurses have finished on-the-job training and begun providing home nursing services.

Neusoft Xikang has been a model for other technology-driven healthcare delivery systems that include a range of medical care through telemedicine, online pharmacy, and associated medical and healthcare services.

Link to DMR Framework indicators

- **Environment: Legal, business, education and culture**
  A public-private partnership of government institutions, Neusoft Corporation and investors (including Hony Capital and Goldman Sachs) has underwritten infrastructure and technology that solve the significant public-policy issue of providing efficient and quality healthcare to the world's largest population.
- **Capacity: Infrastructure, accessibility, affordability and skills**
  The more than 30 million people reached by the Xikang network is only the tip of the iceberg for the overall Chinese population. Whether Xikang or another competitive offering, the system is efficient and highly affordable and scalable, and encourages a new class of health worker. Moreover, the system's efficiencies will promote greater health, as well as cut down on lost productivity from the difficulties of accessing quality medical care in the prior healthcare system.
- **Usage: Government and the private sector/non-government**
  All sectors benefit from the advent of easier access to medical care and information. From a media perspective, the mobile health app permits access to media properties that inform users about health and wellness. Extending this internet-based health management to a personalized health app should scale meaningfully, given the high broadband and mobile penetration as well as a digitally engaged population.

How the case studies demonstrate progress towards enhanced digital media readiness

The framework indicators fundamental to both DMR and networked readiness are applicable in most of the case studies and demonstrate progress. While potential impacts on local MEI industries may not be immediately evident, the link becomes clear by using the DMR Framework (see section entitled "The Framework"). For example, in the Chattanooga case study:

- The prevalent indicators are *Internet Infrastructure*, the most central indicator at the core, and *Investment and Capital*, a business indicator considered critical to DMR.
- This positions Chattanooga on a fast track to increase and improve the K*nowledge, Attitude and Behaviour* of its citizens, the *Citizen Usage of MEI* and *Access to Tech and Hardware*.
- By following the Framework's foundational vectors, this would create a knock-on effect across all related indicators. For example, improved *Access to Tech and Hardware* creates the right conditions for increased *Digital Acumen of Citizens* and a lower *Cost of Digital MEI*.

This logic in using the DMR Framework can be applied to all the case studies, with a similar resulting impact on the future of MEI industries.

Outlook for the Digital Media Readiness Framework

Since this initiative's inception at the World Economic Forum, the Global Agenda Council on the Future of Media, Entertainment & Information has worked closely with Keio University's Graduate School of Media Design (Japan) and the University of Southern California (USA) to develop the DMR Framework for two main purposes:

1. To stimulate cities, nations and other communities to think beyond investment in digital infrastructure and connected networks by embracing the application of ICTs for developing a vibrant MEI ecosystem, which includes (a) an innovative industry of content, products and services; (b) end-user adoption and increased use of MEI; (c) a flourishing network of creative industries; and (d) the regulatory support required to ensure a healthy flow of information and entertainment
2. To add value to the Forum's Networked Readiness Index, a part of the annual *Global Information Technology Report*, by providing the Forum's team of economists with an external perspective on how networked readiness encourages digital media readiness, and on where the Networked Readiness Index may develop further to include additional indicators for measuring a nation's ability to embrace digital MEI industries

The council wishes that its work be applied to advance MEI industries towards having a more fundamental impact on communities' well-being. The DMR Framework could be applied simply, to serve as a basis for initial multistakeholder dialogue on further investment in MEI Industries; or elaborately, to help communities conduct self-assessments and measure their DMR across the 23 defined indicators. A healthy digital MEI ecosystem results in:

- Business model sustainability
- Job development
- Increased opportunities for developing 21st-century skills
- An enriched cultural and artistic heritage through more creativity
- Easier everyday life for citizens
- A more informed society

Regardless of its actual application, the use of the DMR Framework by businesses, governments, academia and civic society should ultimately help ensure a progressive view towards investing in and developing MEI industries.

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