Key findings of the report

The Value of an Open Internet for India

Research Questions

- What is the value of the internet in India?
- Does an open internet increase its value? If yes, what is the value of an open internet for India?
- Does the choice of the internet governance model (multilateral versus multistakeholder) influence openness and consequently the value of the internet?
- What could be the key components of India's internet policy , especially on issues of openness and governance?

Areas of concern:

- Many terms lack clear definitions, change with context, eg. *"Internet openness"*
- Minimal data on *contribution* of different components of India's Internet value chain
- Specifics of the multistakeholder framework

- *Telecom*
- *TCP/IP, DNS*
- *Root Servers*
- *Critical Internet Infrastructure*
- *Network Neutrality*
- *Web Standards*
- *Cyber security*

- *Encryption*
- *Privacy*
- *IPR*
- *Data Protection*
- *E-commerce*
- *Consumer protection*
- *Content policies & Censorship*

- *Child Safety*
- *Human rights*

Discussion Structure

- **Methods and Estimates for the valuation of the Internet in India**
- **Definitions for Openness and its impact on value**
- **Governance Models**

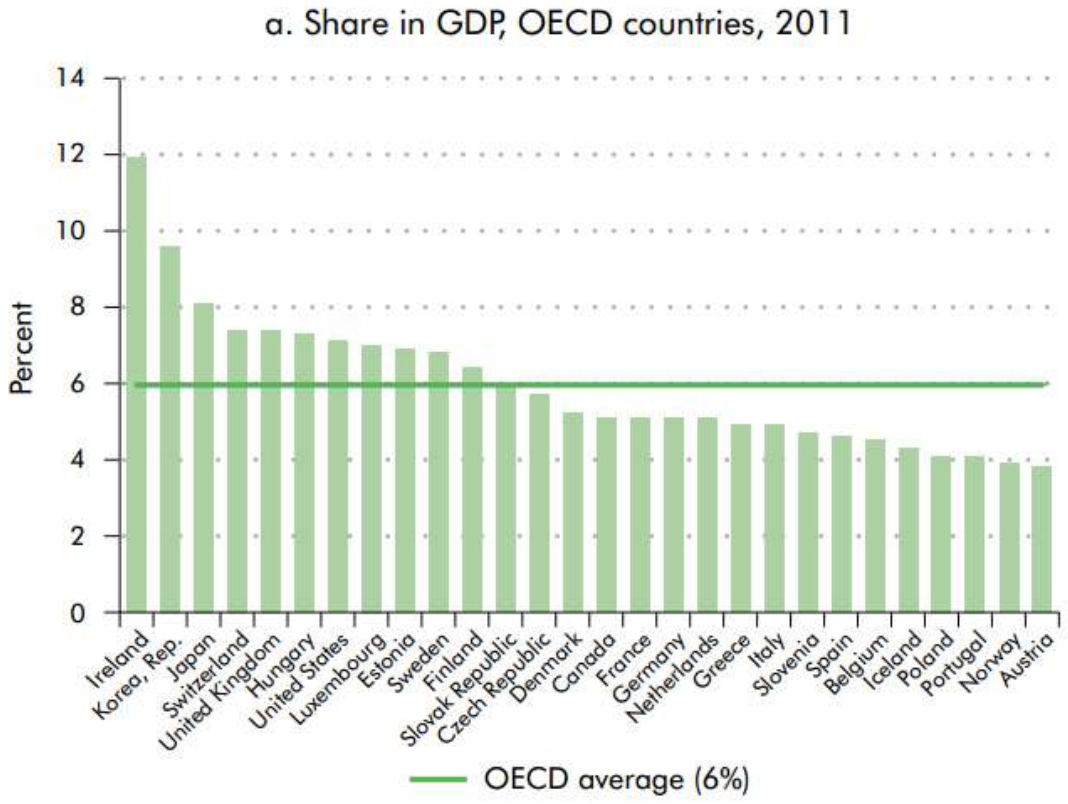
Part I:

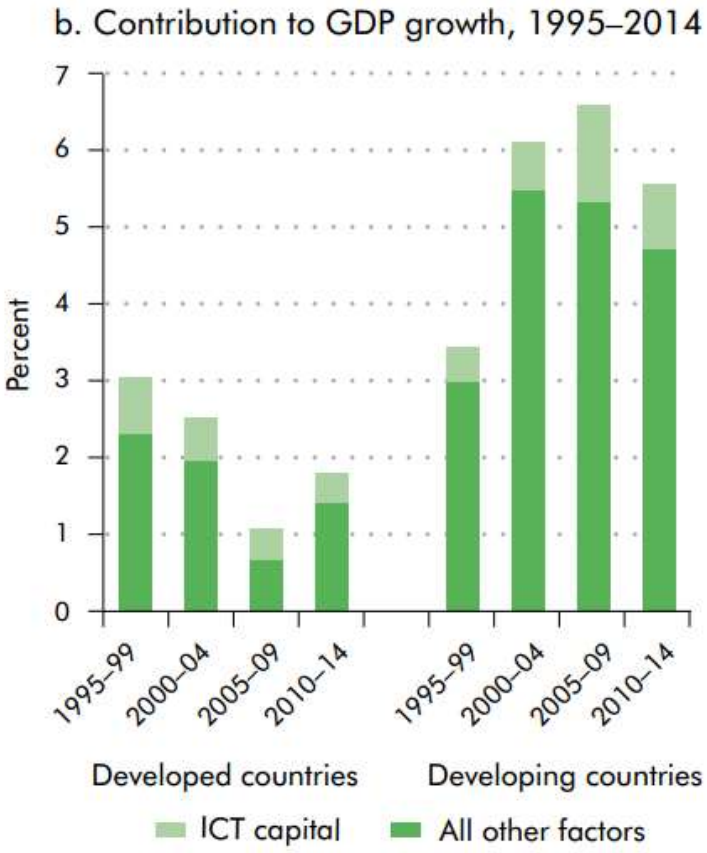
Value of the Internet in India

Existing Estimates of Internet Value

Research by	Country	Methodology	Value
Boston Consulting Group	India	Survey data and stakeholder-based estimates. Methodology adopted across several countries	$60 billion in 2013
Gartner	India	Estimates of IT Spending in India across devices, data centres, software, IT services and telecom services	$67.058 billion in 2014
Copenhagen Economics	India	Expenditure approach for estimating the impact of online intermediaries: sum of private consumption expenditure, investment, government expenditure and net exports	$41 billion – estimate for 2015(intermediaries excluding private investments)
McKinsey & Company	Argentina	Expenditure method using OECD data	2.2% of GDP in 2012
Boston Consulting Group	Hong Kong	Expenditure method	5.9% of GDP in 2009
Boston Consulting Group	Sweden	Expenditure method	7.7% of GDP in 2012

ICT Contribution Across Economies





Challenges of Measurement

- **Defining economic impact/value**
  - General Purpose Technology characteristics, network effects, overlap between social, political and economic gains make it difficult to define the constituents of the static and dynamic value of the Internet.
- **Developing a non-monetary yardstick for measurement**
  - Traditional economic methods use price as the unit of measurement of economic value. Digital expansion has enabled the emergence of goods and services that are often invisible in price, making measurement of value especially complex.
- **The quality problem**
  - Statistical methods have not been able to accurately capture the rapid decline in the cost of digital technologies, gains in quality of consumption as well as product diversification.

Challenges of Measurement

- **Intangible inputs**
  - National Accounts Statistics only extend to purchases of software as far as digital capital inputs are concerned. The intangible inputs, such as investment in human resource systems, business organization etc do not get captured in this data.
- **Data inadequacy**
  - Currently, one of the biggest hurdles (particularly in India) in measuring the value of the Internet is the limited scope of existing surveys and inadequate services data.
  - The nature of the digital transformation is such that it calls for microdata at the individual and firm level.
- **Statistical framework**
  - There is still no widely accepted method to measure the value of the Internet, or define the contours of the digital economy.

ICRIER's Estimates of Internet Value – Method I

- **Expenditure Method**
  - The total expenditure on the Internet is obtained using the standard National Income Accounting identity:

$$Y = C+I+G+(X-M)$$

  - Y: Aggregate expenditure of the economy on the Internet
    C: Private final consumption expenditure on the Internet
    I: Gross fixed capital formation accruing to the Internet
    G: Government expenditure on the Internet
    X-M: Net exports of ICT goods and services (enabled by the internet)

Private Final Consumption Expenditure (PFCE)

- We use “Household Consumption of Various Goods and Services in India”, 2011-12, 68th round, NSSO, and the Reserve Bank of India Database on the Indian Economy (RBI-DBIE) to determine the PFCE accruing to the Internet.
- The PFCE on the Internet consists of four components:
  - Total household expenditure on mobile data
    NSSO data records the total mobile phone charges incurred by households. Since only a part of this accrues to data usage, we weigh this data by the average share of service provider revenue accruing to data usage to estimate the total expenditure on mobile data (20% in 2011-12). The average share of service provider revenue from data usage is based on data from TRAI.
  - Internet expenses
    The annual expenditure of households on accessing the Internet is recorded in the NSSO data.
  - Mobile handset expenditure
    The survey data records the total expenditure of households on mobile handsets. We weigh this by the proportion of mobile subscribers using wireless internet to arrive at an estimate of mobile handset expenditure accruing to the Internet (49% in 2011-12).
  - PC/Laptop expenditure
    The annual household expenditure on PC/Laptops is obtained from the NSSO data. No robust methodology was found to estimate the expenditure accruing only to the Internet.

Private Final Consumption Expenditure (PFCE)

- Limitations of the NSSO survey on household expenditure:
  - Discrepancies between estimates of aggregate consumption expenditure obtained from the survey data and from national account statistics.
  - Estimates obtained from national account statistics typically exceed those obtained from the survey data.
  - Most commonly identified reason for this is underreporting of consumption by richer households (concentrated in urban areas) in surveys.
  - Recognizing the risk of underestimation , instead of estimating the total consumption expenditure of households on the internet, **we use the survey data to measure the share of the total household expenditure that is spent on obtaining access to the Internet. (0.78% for 2011-12)**
- Estimating PFCE for the Internet:
  - We weigh the aggregate PFCE for the economy (obtained from RBI-DBIE) by the share of the total household expenditure spent on obtaining access to the Internet (obtained from the NSSO survey) to estimate the aggregate PFCE accruing to the Internet .

Private Final Consumption Expenditure (PFCE)

Consumption Expenditure Distribution (NSSO 68th round) for 2011-12 in USD billion**	
(1)Mobile phone expenses	9.65
(2) Proportion of mobile phone expenses accruing to data usage: (1)*0.2	1.93
(3)Internet expenses	0.52
(4)Expenditure on PC/Laptop	0.51
(5)Expenditure on mobile devices	1.12
(6) Expenditure on internet on mobile devices: (5)*0.49	0.55
(7) Total consumption expenditure on the Internet of all households: (2)+ (3) + (4)+ (6)	3.51
(8) Total consumption expenditure of all households	451.11
(9) Proportion of household expenditure spent on the Internet: (7)/(8)	0.78%
(10) Total consumption expenditure of the economy	1076.55
(11) Total consumption expenditure accruing to the Internet in 2012: 0.78% of (10)	**8.40**

**The average dollar to rupee exchange rate in 2011-12 was $1= Rs. 48

Gross Fixed Capital Formation (GFCF)

- It is usually possible to estimate GFCF of industries using the Annual Survey of Industries (ASI). However, ASI does not record data on Internet related investments.
- We use the Centre for Monitoring the Indian Economy (CMIE) Prowess database to analyze the distribution of GFCF of 8000 listed companies across various categories of investments.
- We consider the following categories of GFCF:
  - Software additions
  - Computer system additions
  - Communication equipment additions
- According to our calculations, on average, 2.6% of a company's total GFCF accrues to ICT.
- We weigh the total GFCF of the economy (obtained from RBI-DBIE) by this share to obtain the aggregate GFCF accruing to ICT.

Gross Fixed Capital Formation (GFCF)

Gross Fixed Capital Formation (GFCF) in 2011-12 in USD billion**	
(1) Total GFCF in the economy	619.01
(2) GFCF accruing to the Internet in 2011-12: 0.026*(1)	16.09

**The average dollar to rupee exchange rate in 2011-12 was $1= Rs. 48

Government Expenditure on IT

- There is a dearth of publicly available data for government expenditure on IT, especially the Internet
- We use estimates from Gartner's report "Enterprise IT Spending for the Government and Education Markets, Worldwide" for government expenditure on IT.
- Gartner includes spending on internal services, software, IT services, data center, devices and telecom services by both local and national governments.
- The estimate for 2011-12 is $5.98 billion.

Net Exports of ICT goods and services

- Data source: World Integrated Trade Service (WITS), World Bank; RBI-DBIE

Net Exports of ICT goods and services (in USD billion, 2011-12)	
(1) Balance of Trade (goods)	-4.64
(2)Balance of Payments (services): Telecom, Computer & Information	
(i)Telecom	0.16
(ii)Computer	61.08
(iii)Information	-0.04
(3)Total BoP in 2011-12	61.21
(4)Net Exports of ICT goods and services: (1)+ (3)	56.5

Net Exports of ICT goods and services

- Attributing the balance of payments in ICT goods and services entirely to the Internet would lead to an overestimate.
- There is a distinction between the ICT exports made possible through connectivity (dedicated channels) and those made possible by the Internet. If the Internet were to shut down, only a small part of the net exports would be affected.
- Industry experts have suggested that approximately $10 billion of the total net exports of ICT goods and services can be attributed to the Internet.
- We have estimated the total expenditure on the Internet using both these estimates of net exports to provide a range.

Total Expenditure on the Internet in India (2011-12)

Aggregate Expenditure on the Internet in 2011-12	**Upper Bound(USD billion)** ***Internet+ Connectivity***	**Lower Bound(USD billion)** ***Internet***
(1)Private Final Consumption Expenditure	8.4	8.4
(2)Gross Fixed Capital formation	16.09	16.09
(3)Government Expenditure	5.98	5.98
(4)Net Exports	56.6	10
(5)Total expenditure on the Internet: (1)+(2)+(3)+(4)	**87.07**	**40.47**

ICRIER's Estimates of Internet Value – Method II

- We use a fixed effects instrumental variable regression to estimate the impact of the Internet for India . This is a sub-national estimation using panel data regression. The data pertains to 19 states in India for the period 2001 to 2014

$$SGDP_{it} = \alpha_o + \alpha_1 K_{it} + \alpha_2 L_{it} + \alpha_3 ISub_{it} + \varepsilon_{it}$$

K_{it} is gross capital formation excluding investments in telecom in *i*th state in year *t;*

$L_{it}$is the total number of persons engaged in telecom in state *i* for year *t;*

$ISub_{it}$is the number of internet subscribers in the *i*thstate in year *t*;

$SGDP_{it}$is per capita GDP for *i*th state in year *t*;

e_{it} is the error term

- We use a two period lead of the natural log of Internet Subscribers as an instrument for Internet penetration

Results

- Using state data from 2001-2014, the model estimates –
  - A 10% increase in rate of growth of Internet subscribers will result in a 2.4% increase in rate of growth of state *per capita* income.
  - In terms of levels, the model implies that a 16% increase in the number of internet subscribers in 2011-12 led to an increase in the GDP in that year by $62.2 billion.
- Difference in results of the two methods measures the spillover benefits of the Internet-

(1)Expenditure Method (direct value)	$40.5 billion (2.5% of nominal GDP)
(2)Barro's Growth Model (direct and indirect value)	$62.2 billion (3.8% of nominal GDP)
(3)Spillovers: (2)-(1)	**$21.7 billion (1.3% of nominal GDP)**

Part II:

Openness

Understanding Openness

- The Internet's growth is often attributed in large part to its *openness.*
  - Many consider the characteristic fundamental – Since 2007, 7 IGFs have featured *openness* as a primary theme

- Economic benefits
  - Coupled with greater access –
    - "Permission-less innovation" / Light-touch regulation
    - Buyers and sellers can access international customer bases
    - Reduce transactions costs
    - Efficient firms can jump to GVCs
  - On the other hand, policies suppressing openness can create redundant requirements/costs
    - Incentivize large firms to reduce investments, prevent small firms from expanding

- Lack of concrete, universal definition
  - **Openness may then be *technical, economic, political, legal, institutional…***

Definition(s)

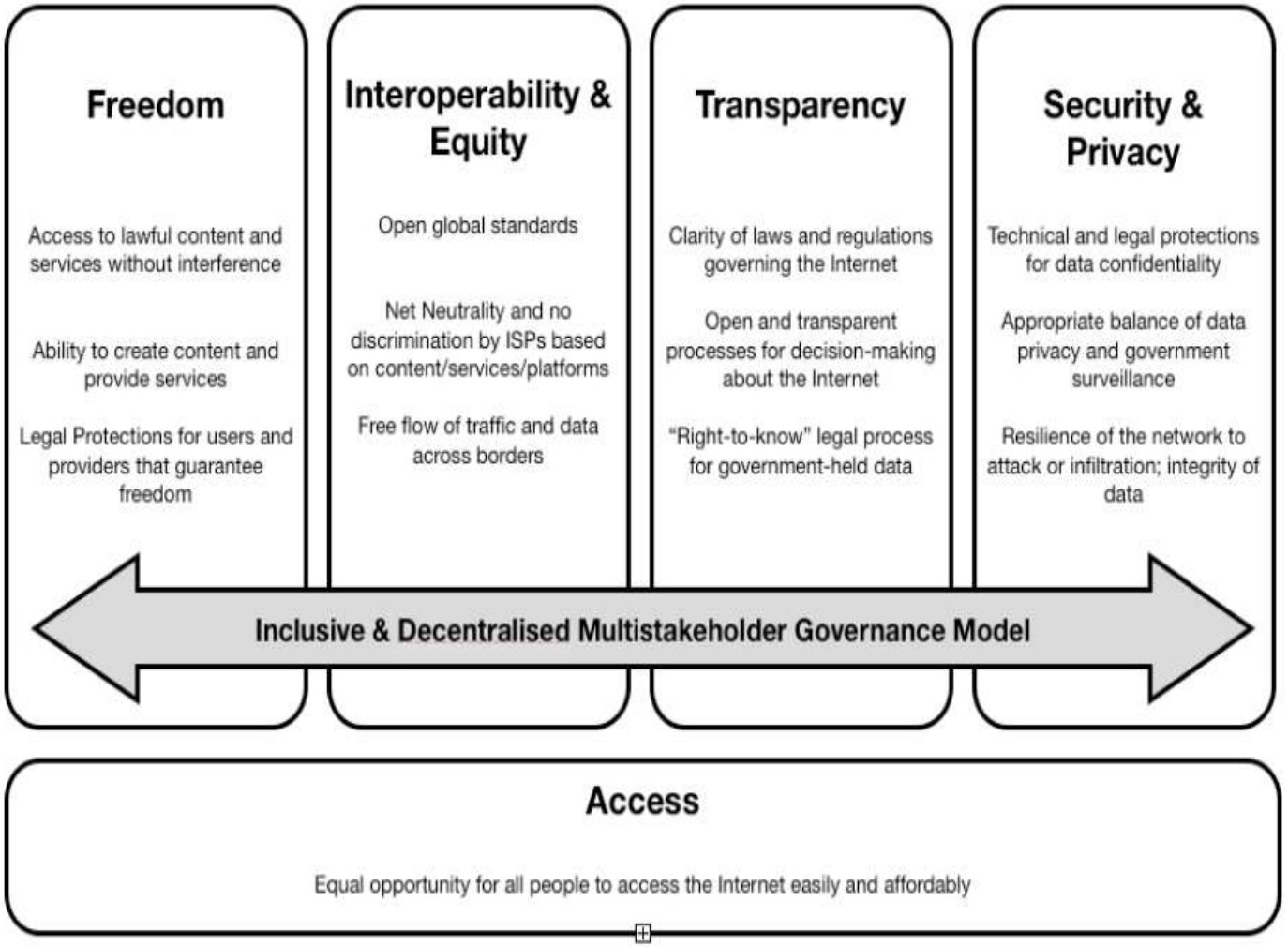
- "Openness" definitions extend to all manner of ways in which the Internet can produce economic benefits (incl. for education, commerce, governance, etc.). Often becomes -

"The Internet" = "The Completely Open Internet"

- Literature and Stakeholder Discussions reveal that envisioning the scope of "the Open Internet" would necessitate measuring –
  - **Freedom of Expression (on the Internet, but also offline)**
    - Including privacy and the possibility of self-censorship
  - **Access to Knowledge**
    - IPR – *Being measured by Dr. Walter Park*
    - User Rights as defined by Exceptions and Limitations ("Fair Use")
    - Alternatives to IP Regimes (FOSS, Open Standards, Open Content, Open Educational Resources)
    - Public Domain
  - **Open Data and Open Government Data**
  - **Fragmentation/Balkanisation/Data Localisation/Mandatory Local Routing (due to the jurisdiction problem which remains unresolved) –** *GDP impacts being explored by the GCIG and Bauer*
  - **Language Universalisation**
  - **Universal Accessibility**
  - **Physical Layer Openness**
    - Such as with bans on unlicensed spectrum for Slum Wifi
    - Identification, Licensing and KYC Requirements that prevent people from going online

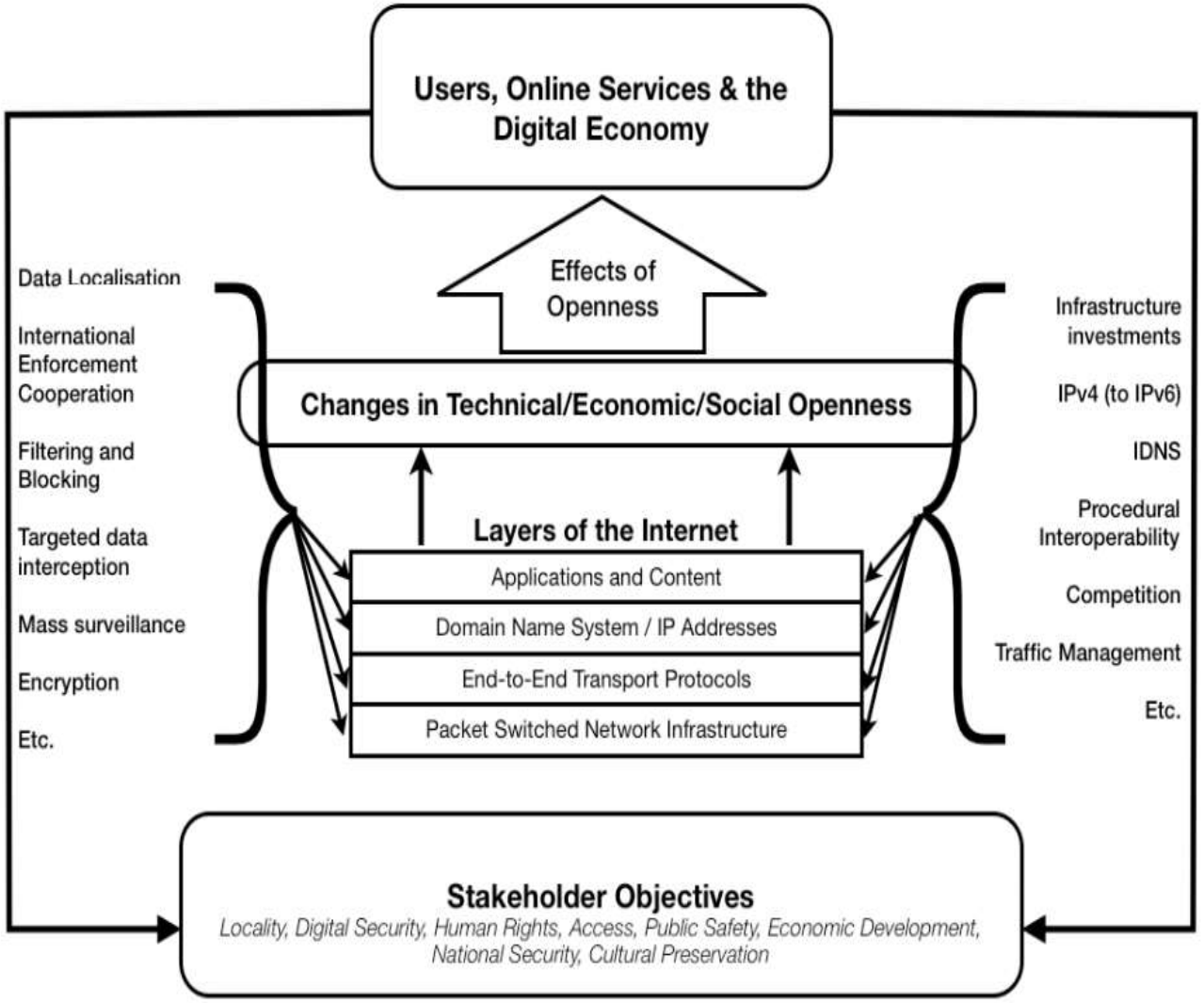
Definition(s)

Dalberg Internet Openness Framework



Definition(s)

OECD Internet Openness Framework



Definition(s)

- An alternate policy exercise suggests measuring the costs of targeted, individual **closed policies –** without attempting to define the entirety of the Internet's form
- Rob Atkinson at the ITIF lists some of these costs as possibly including –
  - Network Inefficiency
  - Limitations on Access to Information –
    - Costs in themselves but also
    - Reduce the perceived value of the Internet itself, disincentivise activity
  - Increased transactions costs
  - Reduced Possibilities for the use of Big Data (including by Governments)
  - Redundant Duplication Costs (eg. Hardware)
- But these again become nebulous – **consequently, attempting to put a number on the exact value of "openness"** ***or the total cost of "closedness"*** **is nearly impossible**
  - Made worse by a lack of data and dependence on counterfactual reasoning

Using Relative Measures

- Relative Measures of openness (and/or “Freedom”) such as the FOTN index and the WEF Network Readiness Index are useful to obtain some idea of the relative changes in country Internet Regimes
- These can then be further used to obtain some sense of the value impact from greater openness or closedness
- Dalberg (2014) plot a relationship between a country’s **FOTN Score** against its score on the **Economic Impacts** sub-index on Network Readiness
  - They find a similar result when plotting Internet Contribution to GDP against FOTN scores (with China as a significant outlier)
- **There is thus some reason to think that more “freedom” on the Internet correlates with an increase in the Internet’s contribution to the Economy**
- We attempt to peg a number of that contribution, given India’s current regime – *which consultations reveal may currently be driven primarily by* Access *and is currently de-facto open/partly free.*
  - The hypothesis on access driving value may now change.

Internet Governance

- Building on the hypothesis of Access as the primary driver of current value
- Stakeholders generally argued that this would mean choice of IG models would presently have minimal effect **on value.**
- **Nevertheless, a number of reasons to focus on India's choice of IG model exist –**
  - In addition to the need for greater and wider representation, there exist the need to –
    - Build Capacity (which takes time)
    - Ensure that India does not become an outlier in IG for a / Encourage Participation across stakeholders
    - Recognize the inherently private and international character of Internet infrastructure and service provision
    - Improve transparency in decision making
- The evolution of the relationship between Government and other stakeholders *domestically* must also continue to evolve along MS lines

Governance Frameworks

- The Internet's operations are predominantly on private infrastructure
  - With significant inter-dependence between stakeholders

	Multilateral	Multistakeholder
Subjects	Existing issues of International law, commerce	Technical architecture, Internet infrastructure, access, security
Concerns	State authority to protect internal political conditions, security	Representation, predominantly private infrastructure
Criticisms	Lack of transparency, non-inclusive, lack of capacity, slow, lack of institutions for redressal	Questions over legitimacy, power differentials between participants, lack of authority, "talk shops"
Participants	Governments, with non-state participation if authorised by participants	Governments, private sector, civil society, technical community, academia

- Conceptually, multi-stakeholder arrangements place a premium on the benefits of *information and resource sharing*, given resource limitations across participants.

Governance Frameworks (Domestic)

- International IG Institutions are relatively easier to build up in a manner that allows non-state participation – *no supreme institution internationally*
  - Domestically, this is not the case.

- Top-down regulatory regimes beset by Transaction Costs
  - Need for reiterative regulation/Trial and Error
  - Information Asymmetry
  - Coordination Problems

- The markers of inclusive, open and multistakeholder institutions include –
  - Robust consultative components within the decision making framework

- Where access is a precondition for unlocking the value of Internet openness, ensuring representation from underrepresented groups is essential
  - Local level fora for discussing IG
  - Capacity building
  - Government assistance for participation
  - Coordinating Umbrella Institutions – *IIGF, Brazil's CGI.br*

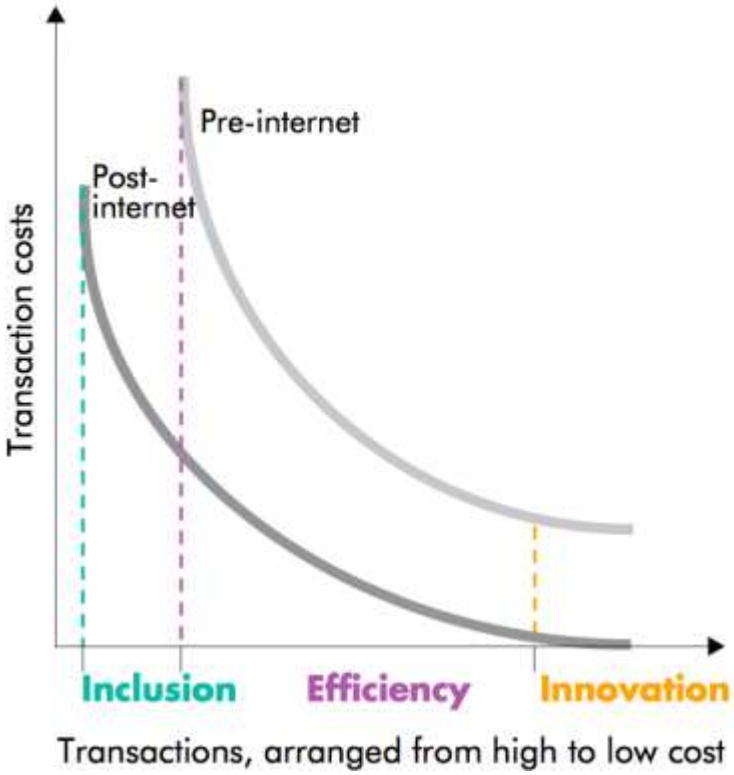
Internet Governance and Openness

- As a GPT, the Internet's value is best unlocked when unconstrained by overregulation
  - Tempering factors include user safety, privacy, cybersecurity

- Widening gap between number of ways Internet can be used / institutional capacity to rapidly absorb changes and evolve balanced responses
  - As regulation lags behind innovation, institutions limited to a single perspective can find it difficult to evolve regulatory regimes that are balanced / pro-growth
  - Other difficulty – implementation

- Multistakeholder institutions better placed to address these

Way Forward



Source: WDR 2016

- Internet Contribution to GDP has an inflection point – there exists evidence of a critical mass
  - The contribution of openness to value will probably increase in the wake of this shift
- Future Work
  - Systematic and regular tracking of Internet Contribution to GDP / Determine point of inflection
  - Gather more data w.r.t. Internet Indicators
  - Track movement of openness indicators against contribution to GDP