Data-driven governance in Sri Lanka

Rohan Samarajiva
chairman@icta.lk; +94777352361

LIRNEasia
Pro-poor. Pro-market.

ICTA
ideas actioned

This presentation . . .

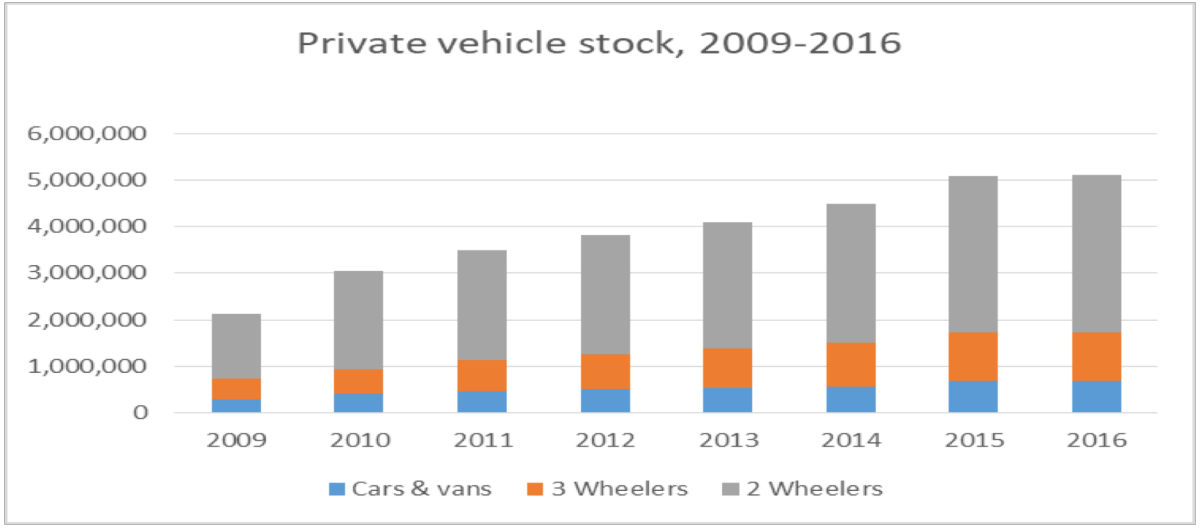
- Seeks to discuss active data-driven governance initiatives of two types from Sri Lanka, a middle-of-the-pack developing country
  - Lower-middle-income country (GNI per cap USD 3,840, current dollars; GNI per capita of USD 11,326 in 2011 USD PPP)
  - Population of 21.4 million (2018 HDI rank = 76)
  - Reached 100th place in Doing Business Ranking in 2018 (advance of 11) but is at 94th place in e Gov Development Index (a retreat of 17 places since 2016)

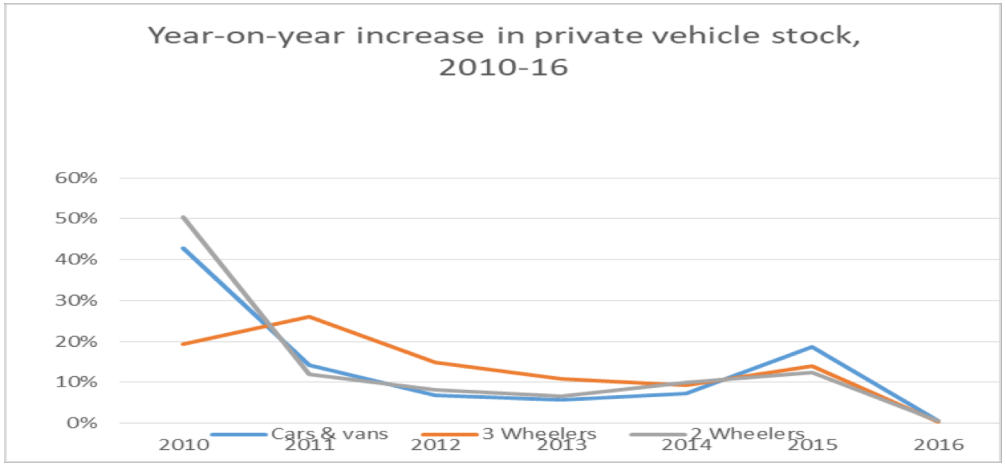
Data-informed governance:

External entity provides insights based on data analytics; government uses insights along with other conventional inputs

Use of data in urban and transport planning

- Since the end of the civil conflict in 2009, massive increase in private vehicles on the roads
- Vehicle stock in each category doubled by 2014, resulting in major congestion, especially in major cities
- Urban and transport planning become high priorities with Western Megapolis Development becoming the country's flagship development initiative





The core of transport and logistics planning has not changed for the last 25 years*

Road networks are modified or expanded based on complex interactions of politics, regional economics, policies and observed demand.

Transportation forecasting is key: estimating the number (and natures) of vehicles or people that will use a specific transportation facility in the future.

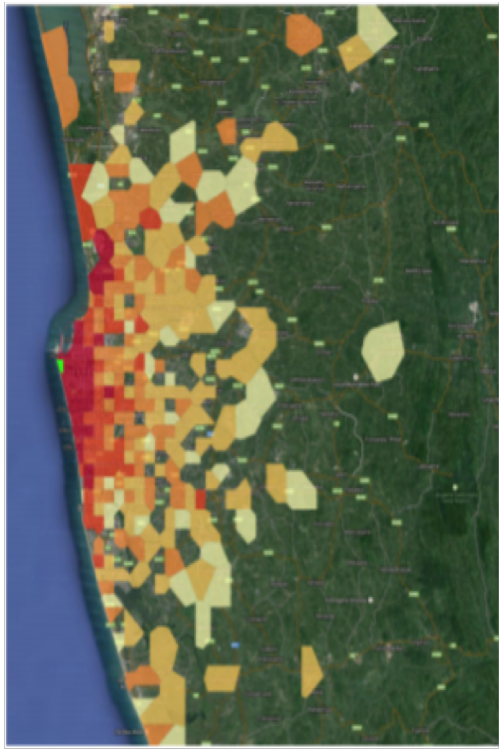
* Kirschbaum, https://www.door2door.io/

Typically, developed countries use a quantitative process to help decision-making

- **Trip generation**
  Determining the origins, destinations, number of trip made by people of a zone, and the purpose for which they travel.
- **Distribution analysis**
  Origins and destinations are then matched, often using a gravity model.
- **Mode-choice analysis**
  Analyzing the modes of transport for these trips - usually auto or transit.
- **Route assignment**
  allocating different modes of transport to a planned route and using various models to understand how traffic patterns change.

This is paired with policy and with **land-use forecasting**, which tries to take into account things such as population growth, employment, socioeconomics of zones in a given region.

Where data analytics can help is with insights that are otherwise expensive to capture



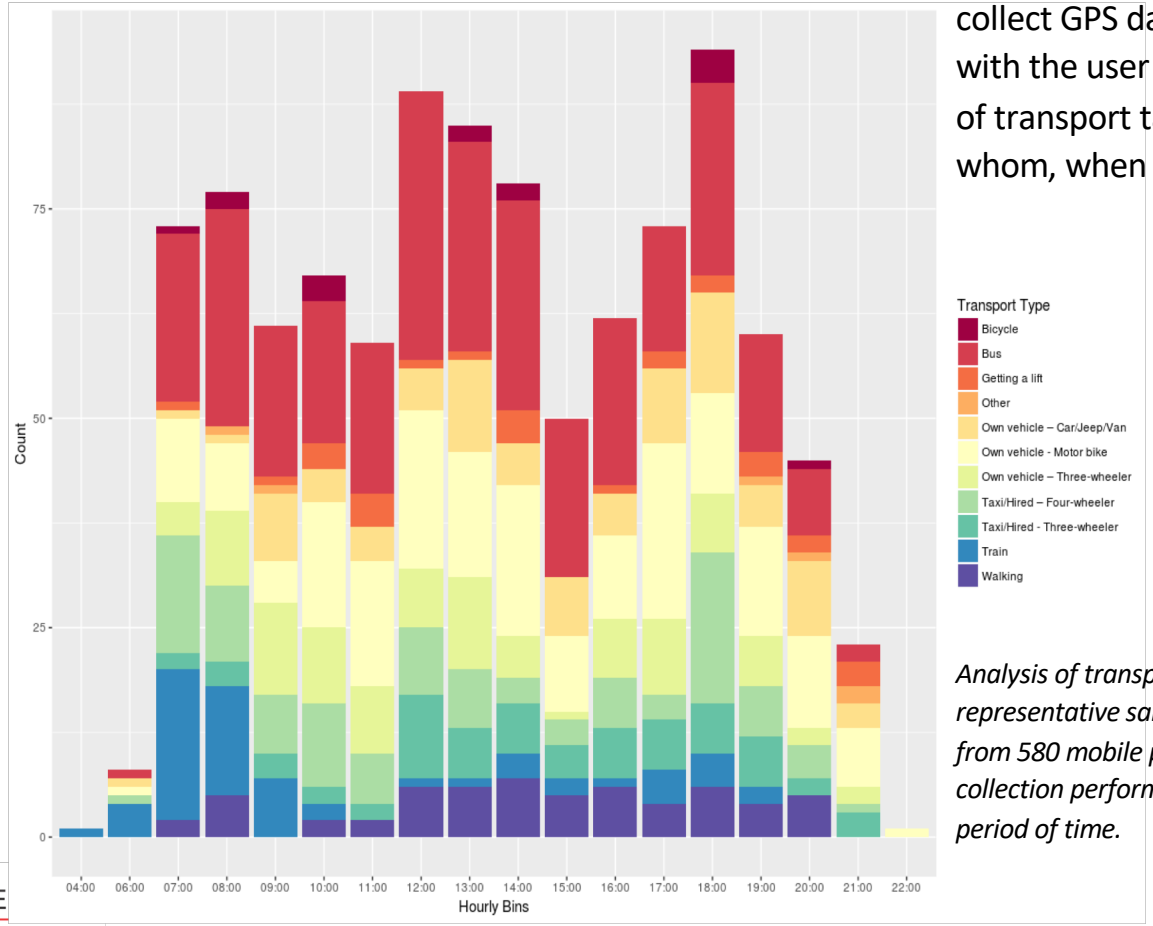
1. Mobile network data can be used to estimate origins destinations and to generate trips between them.

This is something that would otherwise require enormously detailed surveys.

Geographical distribution of origins to Colombo Fort, based on 2013 call data. D. Maldeniya, A. Kumarage, S. Lokanathan, G. Kriendler, K. Madhawa, "Where did you come from? Where did you go? Robust policy relevant evidence from mobile network big data", CPRSouth, 2015.

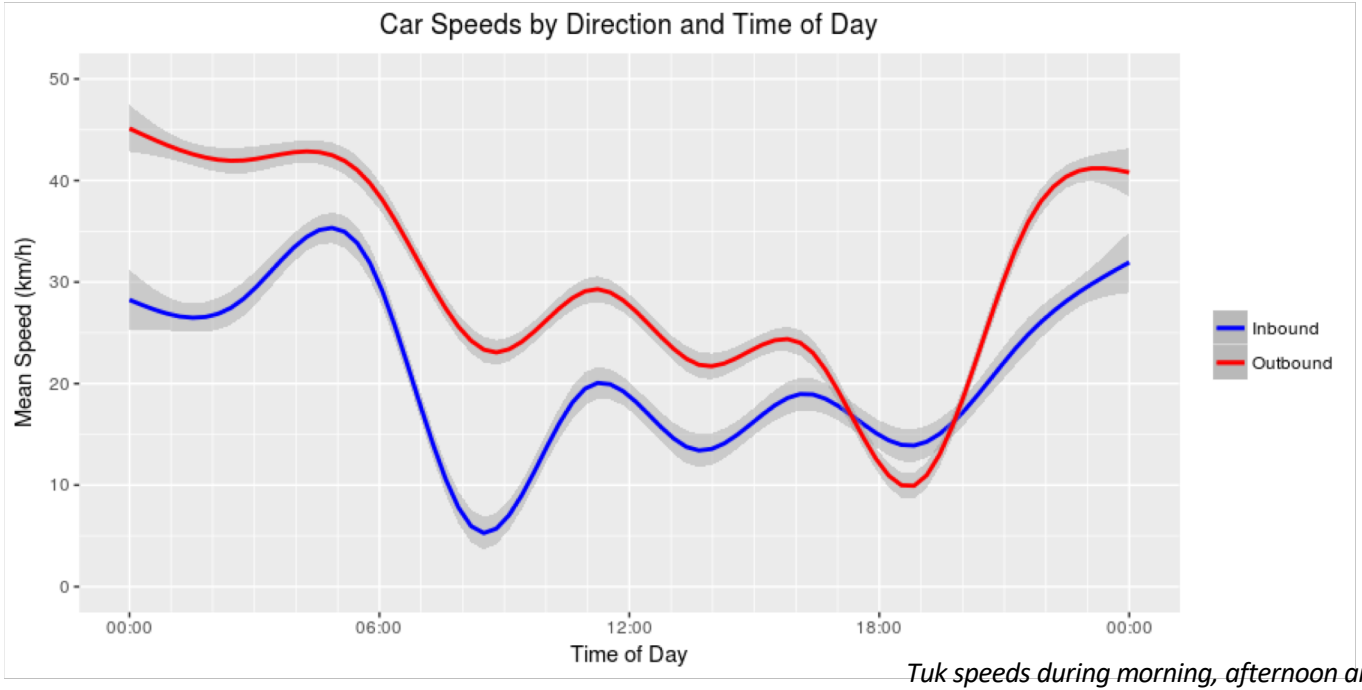
LIRNEasia
Pro-poor. Pro-market.

2. Smart survey applications that can collect GPS data while interacting with the user can describe the types of transport taken for these trips, by whom, when and what for.



Analysis of transport modes from (a non-representative sample) of over 9000 data points from 580 mobile phone users in Colombo. Data collection performed by an application over a period of time.

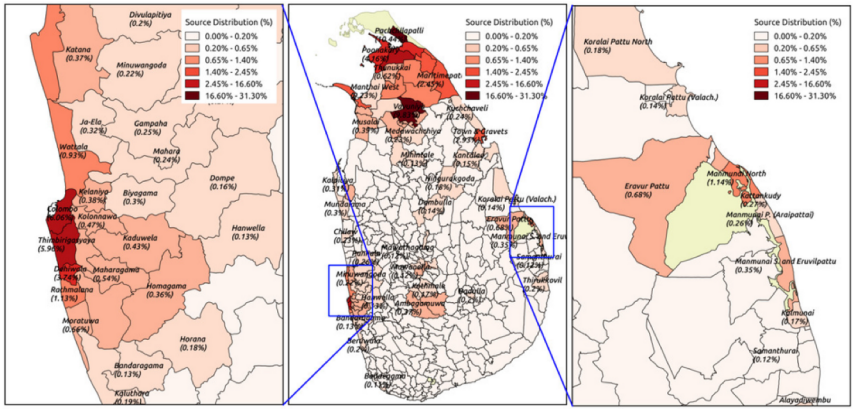
3. And finally, allow us to test the efficacy of proposed routes by analyzing speeds, times, and where bottlenecks form.



Tuk speeds during morning, afternoon and evening traffic peaks.

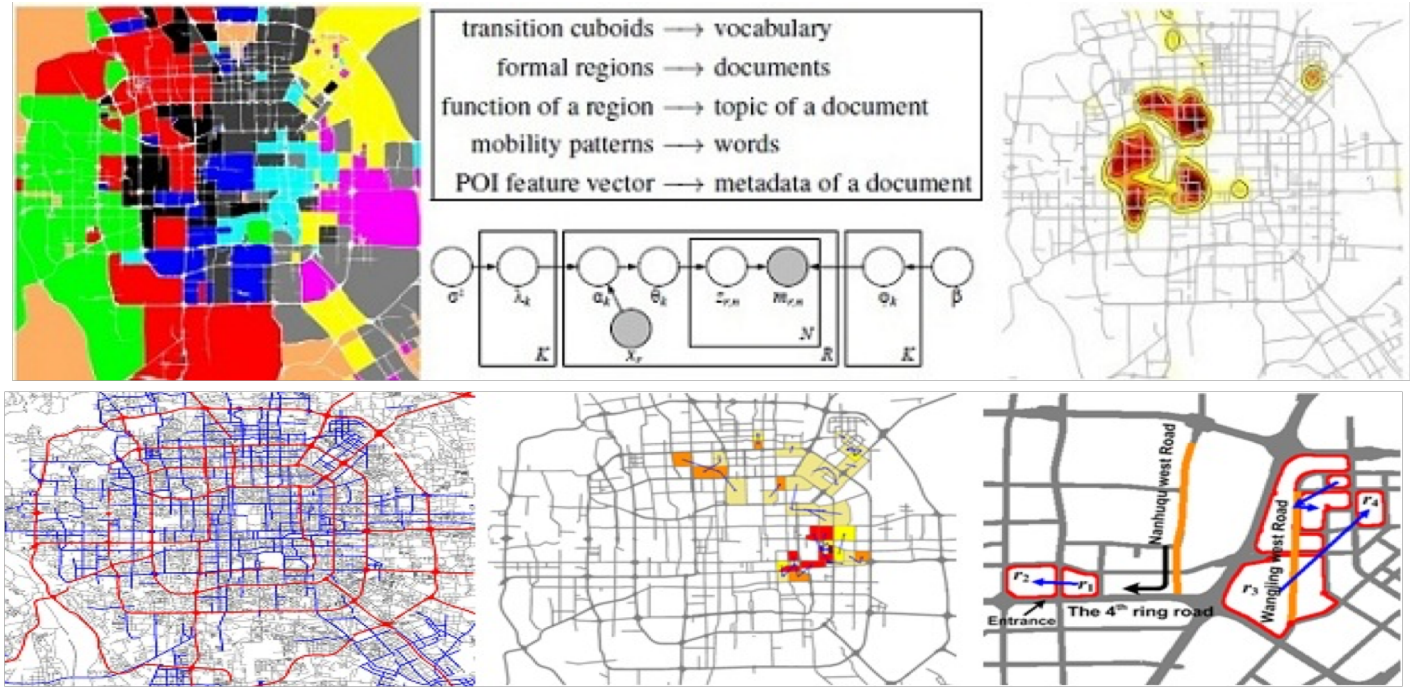
4. Big data can even aid in analysis of land use and population change. And all of this can be done faster than with traditional sources of data (surveys) and more frequently.

Figure 4: Expansion of Colombo city's Central Business District (CBD)



Using mobile network big data for land use classification, Kaushalya Madhawa, Sriganesh Lokanathan, Danaja Maldeniya, Rohan Samarajiva, 2015.

Using mobile network big data to analyze population inflow to Jaffna during the Nallur festival. The estimated origins of these visitors can shed light on the socioeconomic shift during that time.



Slides from Microsoft Research.

ICTs can tell us about emerging patterns and hotspots that we may otherwise not see and help detect problems with existing road networks.

*Jing Yuan, Yu Zheng, Xing Xie. Discovering regions of different functions in a city using human mobility and POIs. 18th SIGKDD conference on Knowledge Discovery and Data Mining (**KDD 2012**).*

However, planning is only one component. Road networks are not static things

Transport is dynamic: within the day and within the week; what we need when we're young and single, what we need when we have families and what we need when we are old.

A key feature of being able to collect this data at scale and frequently is that we can continuously monitor how people use road networks once they are built.

The analyses that help to plan roads can be run indefinitely.

Traffic speeds at different times on a newly constructed flyover, using data from taxis

LIRNEasia
Pro-poor. Pro-market.

Data-driven governance:

Changes to government VPN’s resource allocation policies by a government organization

Government VPN, Lanka Government Network 2.0

- Network was cut over in 2018 January
  - Original design was to allow 100 Mbps for all connected sites (756 in first instance)
  - Payments made by ICTA, free to users
  - Capacity assigned in four bands (50 Mbps, 20 Mbps, 10 Mbps, 2 Mbps) based on administrative criteria
    - All major hospitals assigned 50 bps; also few selected Ministries such as Finance & Health
    - Other major Ministries and departments assigned 20 Mbps (10)
    - Some offices 10 Mbps (89)
    - Some District and Divisional offices 5 Mbps (108)
    - Others 2 Mbps (549)
  - Payments based on assigned capacity, not actual use

ICTA
ideas actioned

The problem

- Because of delays in connecting Lanka Government Cloud 2.0 to LGN 2.0, many e services were delayed, leading to low use
- Some e services (e.g., Pensions) had to be delivered over other forms of connectivity because not all relevant offices were served by LGN 2.0
- Actual use on average in June-August was ~10% of assigned and paid-for capacity

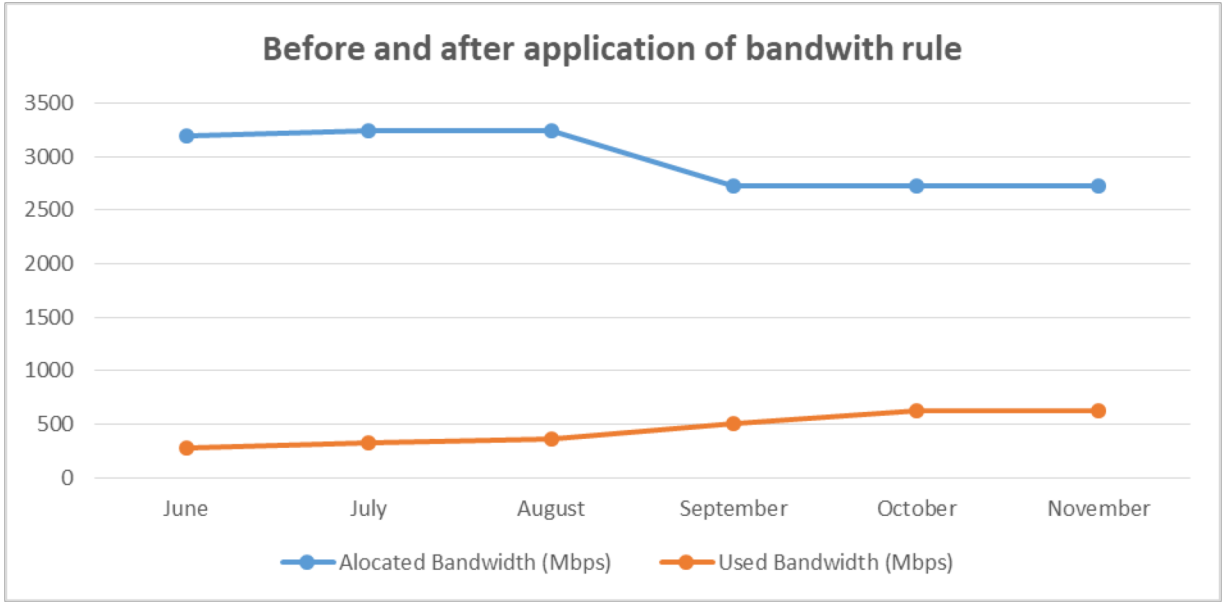
ICTA
ideas actioned

The data-driven solution

- **Downgrade Rule 1**: If maximum bandwidth utilization of a particular site is below the bandwidth of immediate lower bandwidth group, the site is moved to immediately lower bandwidth group
- **Downgrade Rule 2**: If average bandwidth utilization of a particular site is below 50% of immediate lower bandwidth group, the site should be moved to immediate lower bandwidth group.
- **Upgrade Rule**: If average bandwidth usage on past 3 months is more than 85% and it has reached its maximum at least once a day, 70 % of days during last two weeks, the bandwidth should be increased to the next immediate group.

ICTA
ideas actioned

Use increased by 84%, but because assigned capacity was reduced capacity utilization doubled to 20% from 10%



ICTA
ideas actioned

Capacity increases were done ad hoc, not based on Rule 3

- Ministry of Home Affairs requested increases for 23 sites which had heavy use of e services
  - In some locations such as Jaffna District Secretariat use exceeded previous limit (3.23 Mbps in October 2018, versus cap of 2 Mbps prior to September)
  - However, in many locations administrative allocation was not justified by actual use (e.g., Gampaha District Secretariat, where highest use was 0.49 Mbps in October, despite increase of cap from 2 Mbps to 5 Mbps)
- Data-driven increases would have been more efficient

ICTA
ideas actioned

Cost savings of LKR 0.5 million (USD 2,777) per month since rules were implemented

- However, little more can be done to reduce costs because of contractual constraints
- Focus now must be on increasing use from 20% ➔ 100% to yield greater value for the public's money; if that can be done, government would be able to use the engineered capacity of 100 Mbps, and the VPN supplier will also benefit from increased revenues

ICTA
ideas actioned

Increasing use

- Current approach is to
  - Lecture to convened government officials
  - Introduce cross-government productivity applications to increase network use
  - Promote open source productivity apps such as cloud based Vcon (Zoom, Skype , Google handout, etc.) to increase use
  - Offer public WiFi to visitors of Divisional Secretariat offices
- Data-driven approach under discussion is to
  - Identify high users (organizational as well as individual) from available data
  - Develop case studies to be used in promoting higher use
  - Identify low users for targeted intervention
  - Segregate and measure different data streams (e.g., to Lanka Government Cloud 2.0 for e services v Internet) and optimize resource allocation accordingly

ICTA
ideas actioned