

PROJECT PINGER

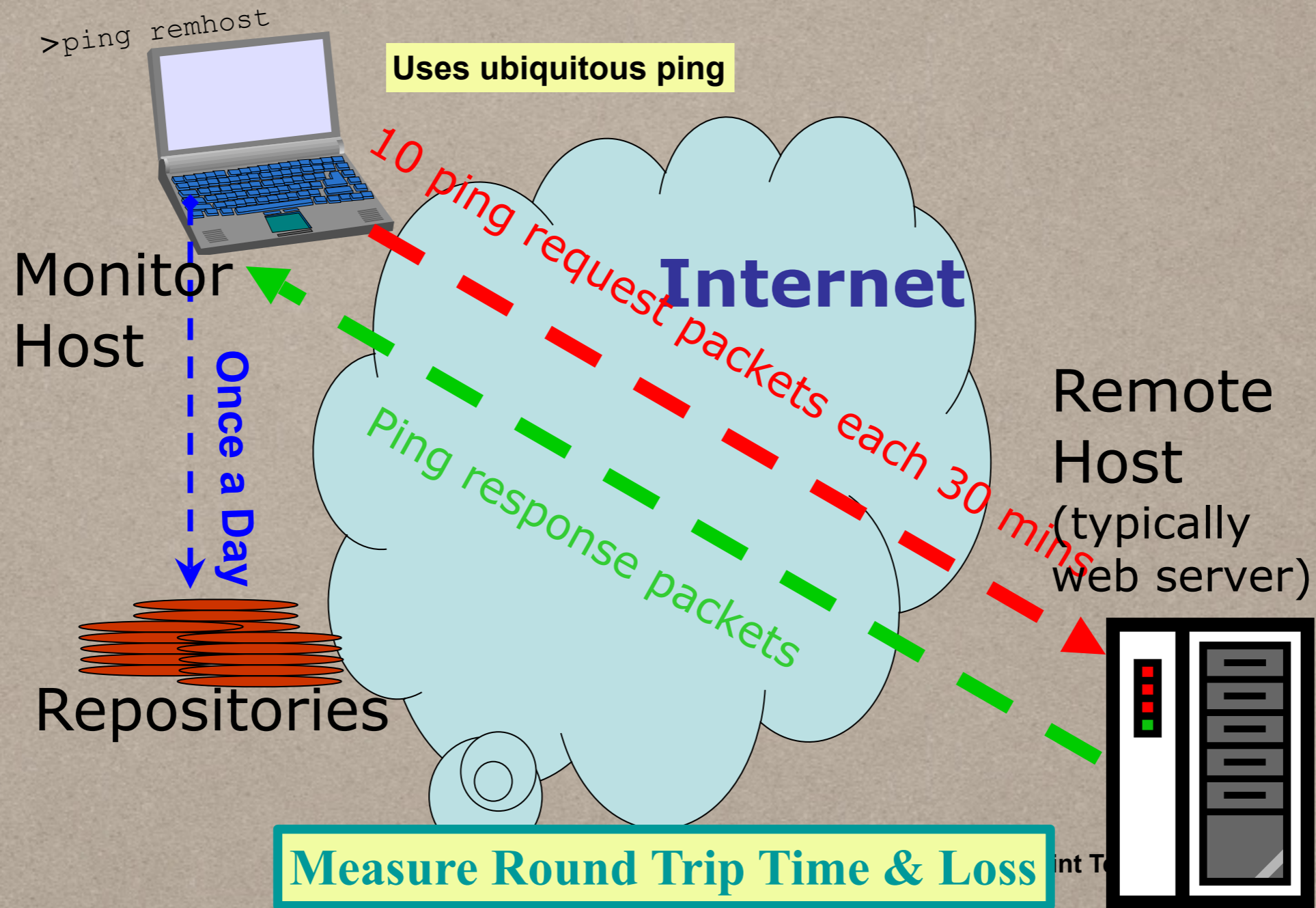
BACKGROUND AND FUTURE



AGENDA

- History of PingER
- Relevance of PingER in present scenario
- PingER for Internet Service Providers
- PingER Research Opportunities

HISTORY OF PINGER



PINGER IS INTERNET MEASUREMENT TOOL

BASED ON PINGS FROM MULTIPLE HOSTS ACROSS THE GLOBE TO MULTIPLE SITES ACROSS THE GLOBE
 PRIMARY FOCUS IS CAPTURING THE USER EXPERIENCE

EARLY PINGER

- Dr. Les cottrell writes about PingER
- “As the head of networking at SLAC, I set up the system using ping simply to test connections between the laboratory and several dozen research institutions in about a dozen countries that were collaborating on a physics experiment known as BaBar to study properties of subatomic particles.” That was back in 1995 when Internet was in its infancy
- “Over the next half-decade, as word of PingER’s value spread, I extended monitoring to hundreds more physics laboratories and science centers across the globe. But the project didn’t take a humanitarian turn until 2001”

EXTENSION TO DEVELOPING REGIONS - 2001 ONWARDS

- Driven by ICTP's (Italy) goals of bringing first-class science and technology to developing countries they wanted to know how well the networks were working.
- The simple PingER project was the perfect tool for the job. Ubiquitous ping so nothing to install at remote targets.
- ICTP offered to help expand the project to those parts of the world that needed it most.
- Within the next year, we began establishing monitoring and target hosts in countries as diverse as Ecuador, Rwanda, Jordan, and Bhutan.

EXTENSION TO PAKISTAN

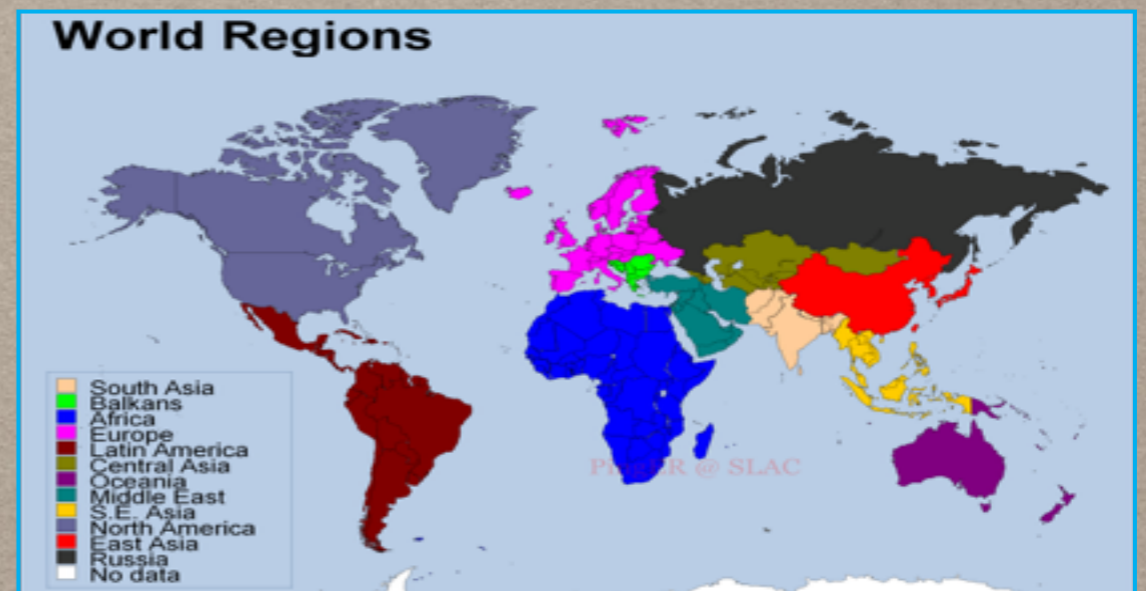
- In 2004, SLAC set up joint agreement with NUST, Pakistan.
- Soon it was clear how much difference PingER can make.
- Set up a PingER monitoring site in the country to assess performance on the then year-old Pakistan Educational Research Network (PERN).
- The network's providers touted its bandwidth of 155 Mbps, impressive at the time. But PingER revealed that the "last mile" links to universities were dreadful. These bottleneck connections funnelled data at no more than 1 Mbps, causing long delays and high packet loss.
- Based on PingER findings, 1 Gbps last mile links to all universities was added into extension plan of PERN2, which started in 2009
- Project was funded by NSF grant worth USD 192,000

EXTENSION TO MALAYSIA

- Started in 2012
- MoU between SLAC and UNIMAS, Sarawak
- Not taken a real flight because
 - potential for help to ISPs not realised
 - Potential for publications not realised

PRESENT STATE

- Covers 99% of World Population
- 99.5% of Internet users are covered
- 950 remote sites in 170 nations.
- 90 dedicated monitoring sites
- 17 years of history
- 16 metrics



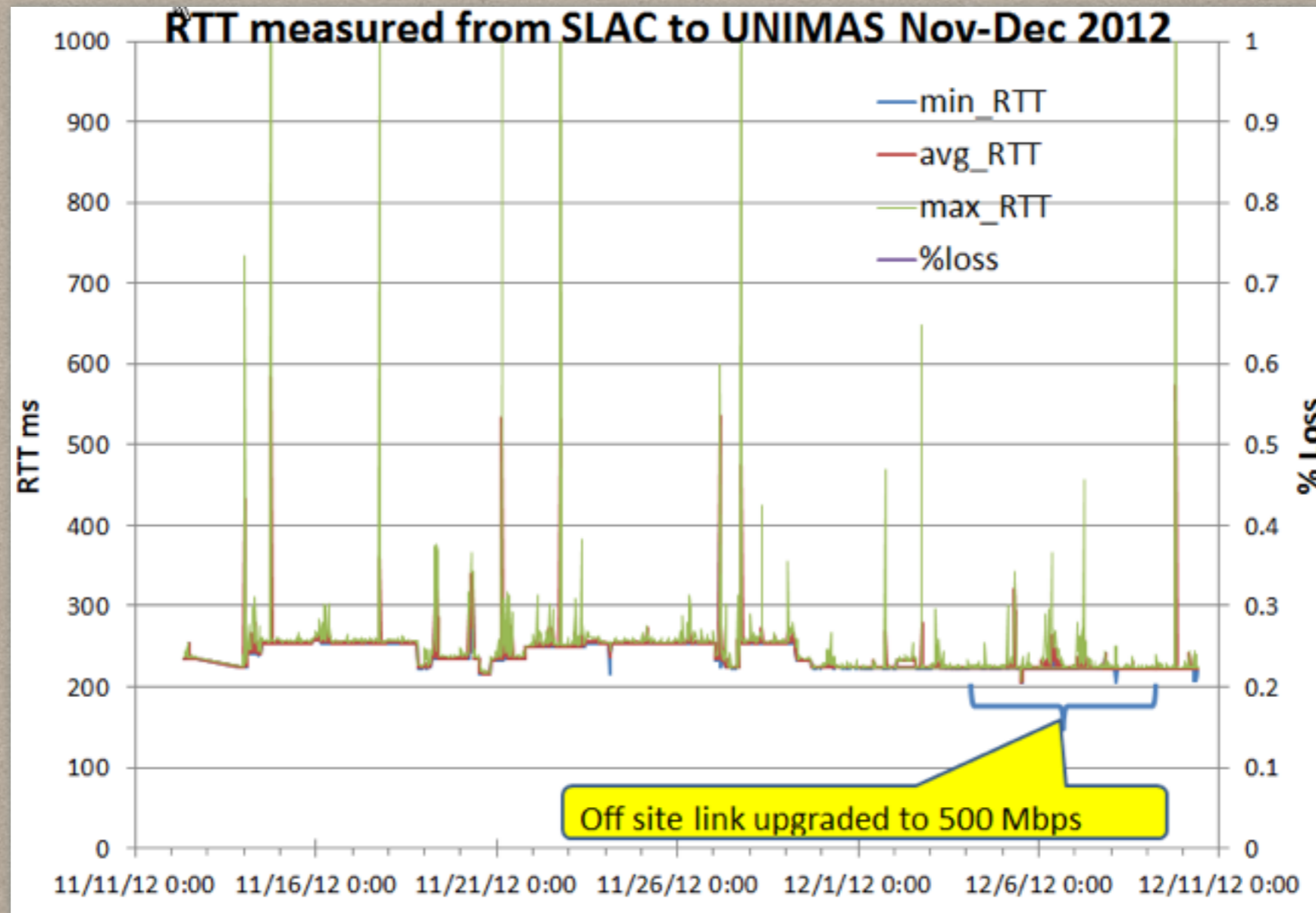
RELEVANCE OF PINGER

- So many advanced Internet performance monitoring and health measurement tools have been developed. What makes PingER still relevant?
- What is this collection of Pings good for?

“It’s best to have your tools with you. If you don’t, you are apt to find something you did not expect and get discouraged”

-Stephen King, On writing: A memoir of the craft

CASE 1: EFFECT OF LINK UPGRADE



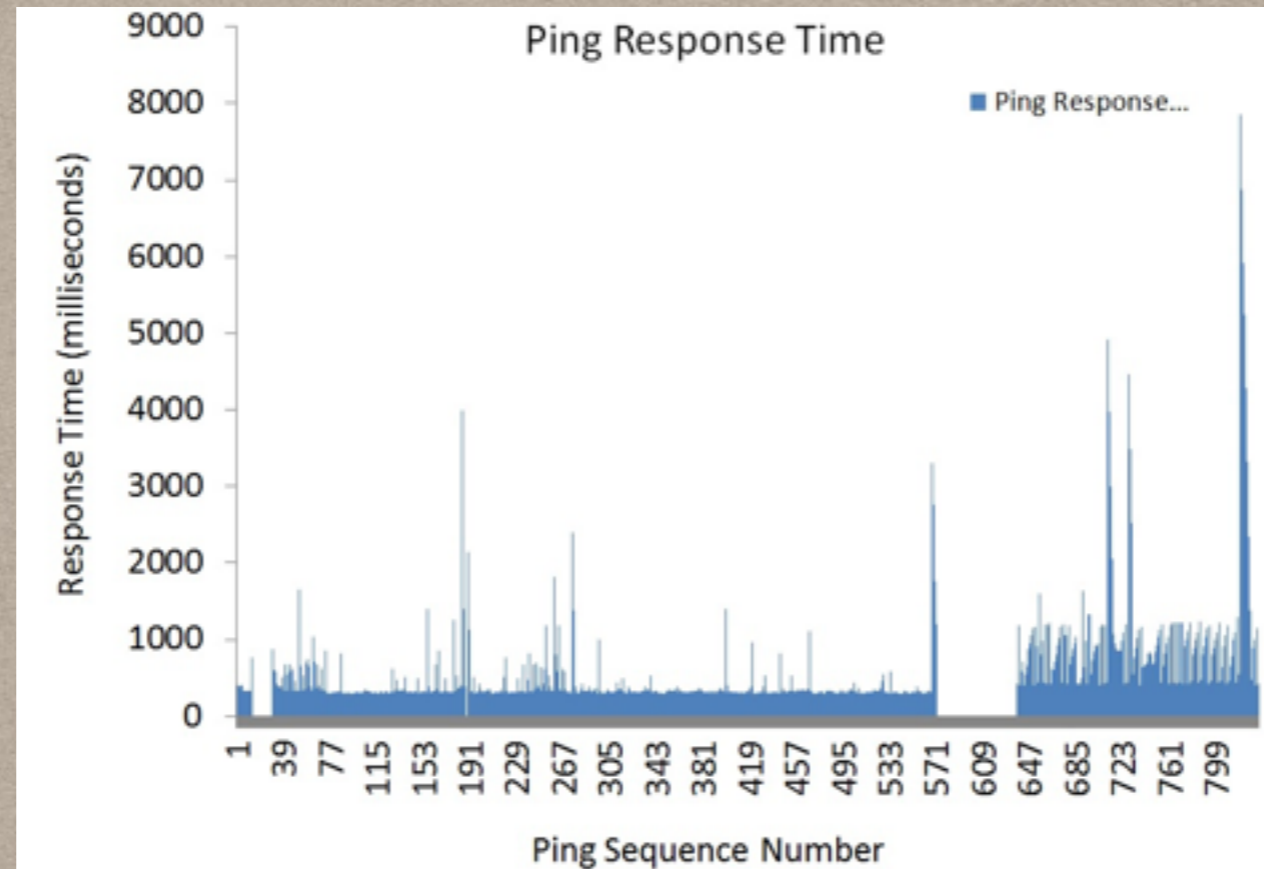
EFFECTS OF LINK UPGRADE TO UNITS

200 MBPS -> 500 MBPS

DERIVED THROUGHPUT VALUE

- Using Mathis formula
- $RTT=250\text{mSec}$, $Loss = .25\%$, $TCP\ TP = 747\text{Kbps}$
- $RTT=225\text{mSec}$, $Loss=.22\%$, $TCP\ TP = 885\text{ Kbps}$
- Above is the outcome of upgrade from 200Mbps link to 500Mbps link

CASE 2: RIGHT TOOLS AT RIGHT TIME



PERFECT HIGH SPEED CONNECTIVITY

NO DATA EXCHANGE

PINGER FOR INTERNET SERVICE PROVIDERS

- It is important to realise that no other tool holds that rich a history of data.
- Effectively you have a view of all past Internet activities and can draw inferences for your network
- Right kind of analysis can result in findings that can really improve the user experience
- Someone needs to sit and develop the analysis part

**I LEAVE THE REST TO YOUR
IMAGINATION**

PINGER RESEARCH OPPORTUNITIES

NETWORK ANALYSIS

DATA MINING

METRICS VISUALISATION

EVENTS ISOLATION

CAUSE AND EFFECT PREDICTION

BIGDATA STORAGE AND ANALYSIS

BY DEFAULT DATA IS BEING STORED IN FLAT FILES
STORE DATA USING BIG DATA FRAMEWORKS
IMPROVE ANALYSIS TIME
DEVELOP FRAMEWORK FOR METRICS CREATION

GEOLOCATION

IMPROVING THE ACCURACY
REGIONAL GEOLOCATION

HUMAN DEVELOPMENT INDEX

CONTRIBUTING TOWARDS HDI METRICS

DEVELOPMENT

SPREADING THE INFORMATION WHERE IT IS NEEDED