Measurement Lab

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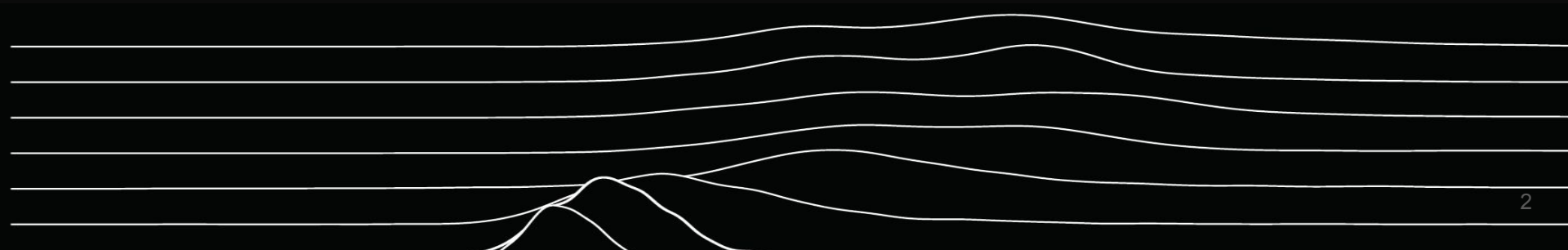
***Session 3*:**

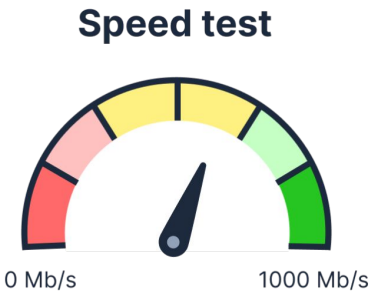
The Internet Quality Barometer (IQB) Framework & the Way Forward for Education

Internet Quality Barometer (IQB)



IQB main goal

→ Redefine Internet quality beyond “speed” ←



Project funded by the Internet Society Foundation Research Grant Program

Quality Internet ≠ “High-speed”

- Internet quality depends on the use case
  & it’s not always about “speed”

- E.g.,
  Web browsing  → latency is important
  vs.
  Online gaming  → latency & download/upload throughput
  vs.
  Online backup  → download/upload throughput

IQB

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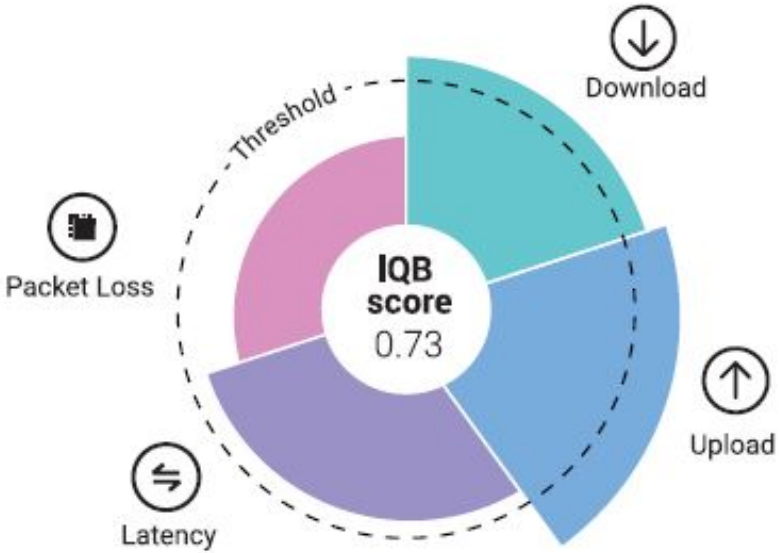
If decision-makers want to make data-driven decisions about improving the quality of the Internet, what metric(s) should they use?

→ welcome to the IQB framework!

IQB score

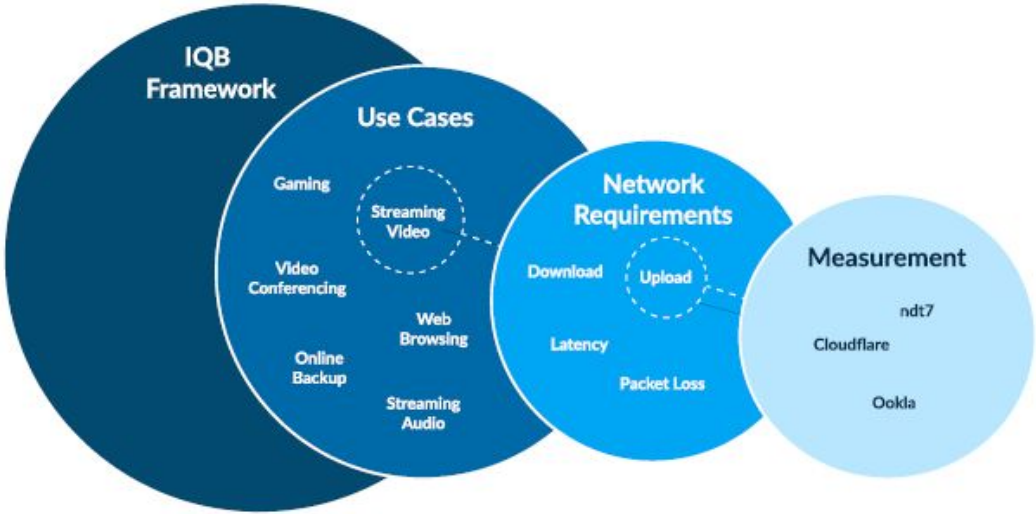
- The goal of IQB framework is to calculate a ***score*** (i.e., a composite index) that characterizes the Internet Quality
- IQB score → from 0 (low quality) to 1 (high quality)



IQB framework

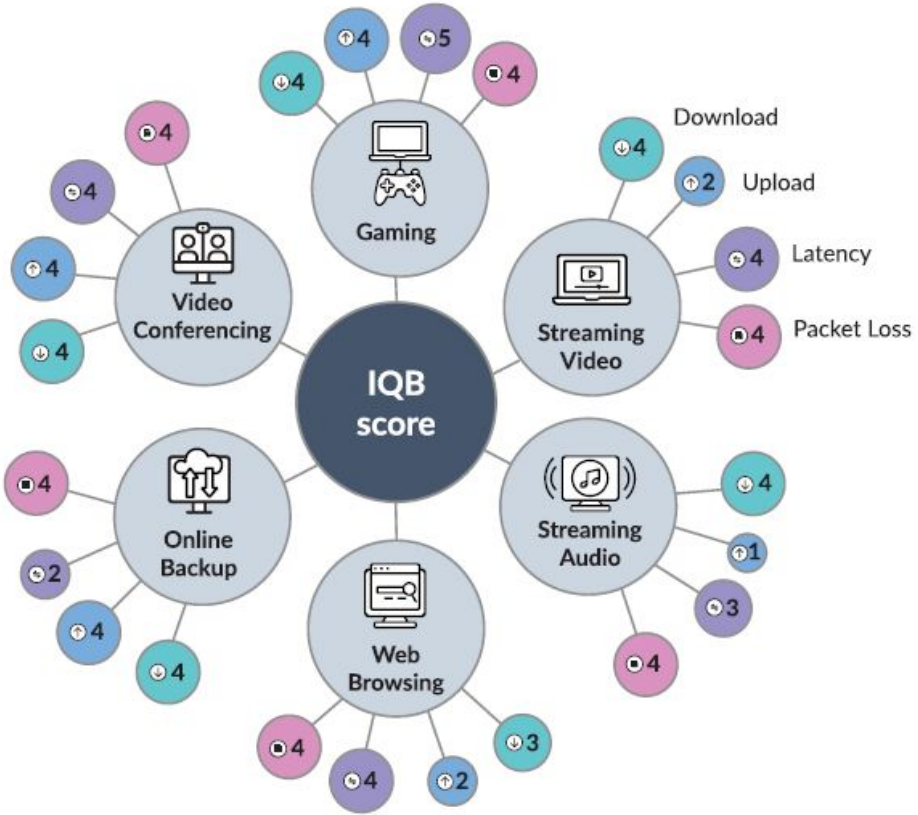
What should we take into account?

- Multiple use cases (video streaming, web browsing, etc.)
- Multiple network requirements (throughput, latency, etc.)
- Multiple measurements/datasets



IQB framework

- Network requirements contribute to use cases
- Use cases contribute to the IQB score
- Different weights per requirement and use case



Designing the IQB framework

- With the help of experts & stakeholders (research, industry, policy-making, etc.)
- >60 experts
- Interviews & Workshops

Designing the IQB framework

- Network requirement ***thresholds*** for minimum & high quality per use case

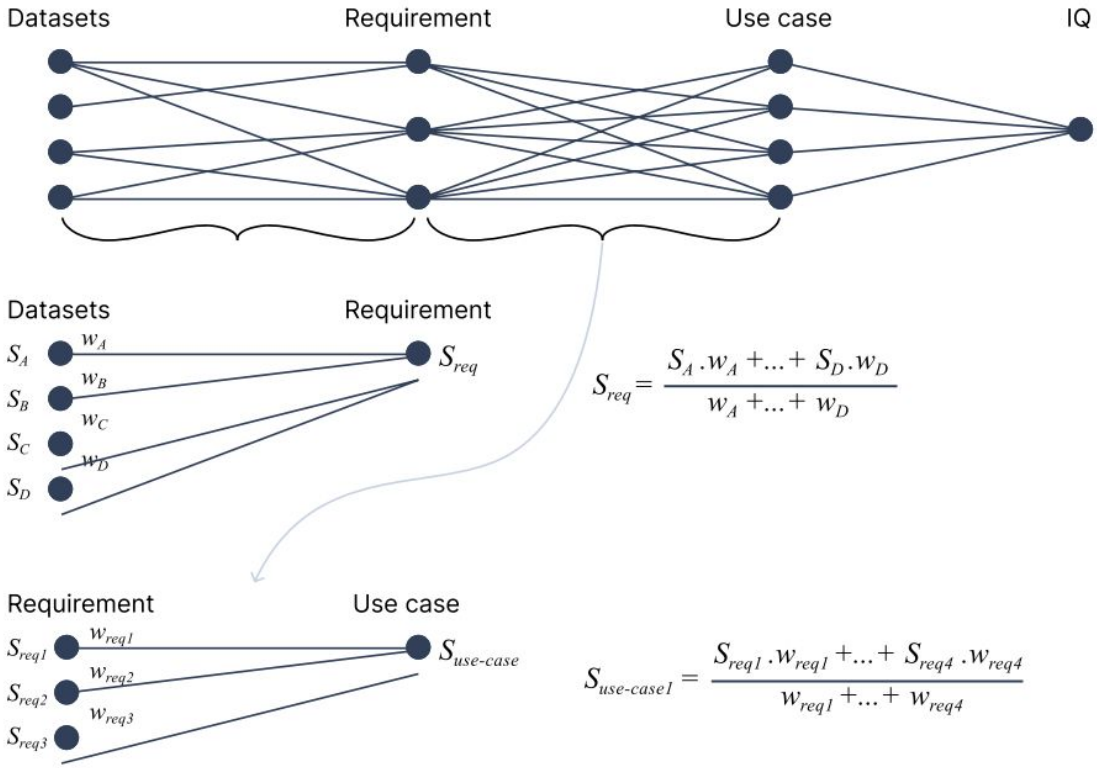
Use case	Download Throughput		Upload Throughput		Latency		Packet Loss	
	for min quality	for high quality	for min quality	for high quality	for min quality	for high quality	for min quality	for high quality
Web Browsing	10Mb/s	100Mb/s	10Mb/s	Other	100 ms	50ms	1%	0.5%
Video Streaming	25Mb/s	50-100 Mb/s	10Mb/s	10 Mb/s	100 ms	50ms	1%	0.1%
Video Conferencing	10Mb/s	100Mb/s	25Mb/s	100Mb/s	50 ms	20ms	0.5%	0.1%
Audio Streaming	10Mb/s	50Mb/s	10Mb/s	50Mb/s	100 ms	50ms	1%	0.1%
Online backup	10Mb/s	10Mb/s	25Mb/s	200Mb/s	100 ms	100ms	1%	0.1%
Gaming	10Mb/s	100Mb/s	10Mb/s	Other	100 ms	50ms	1%	0.5%

Designing the IQB framework

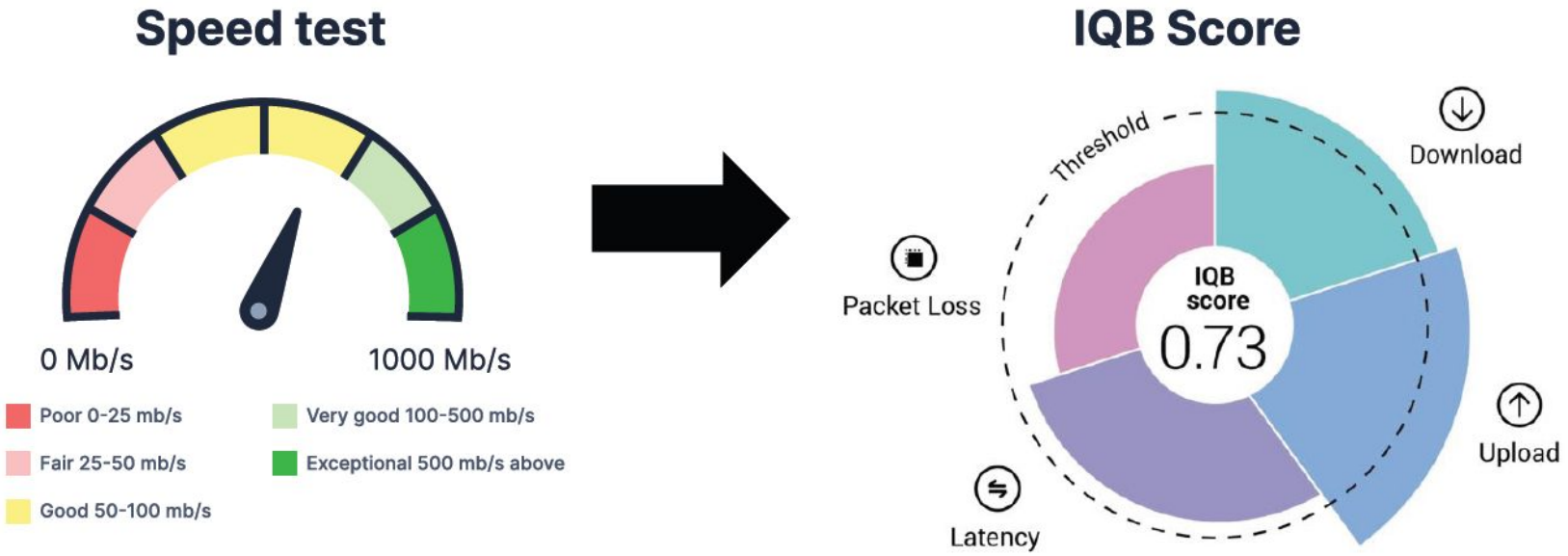
- Network requirement ***weights*** per use case

User case	Metric	Weight (1 to 5)
Web Browsing	Download speed	3
	Upload speed	2
	Latency	4
	Packet loss	4
Video Streaming	Download speed	4
	Upload speed	2
	Latency	4
	Packet loss	4
Audio Streaming	Download speed	4
	Upload speed	1
	Latency	3
	Packet loss	4

IQB score calculation



IQB score


Speed test
0 Mb/s
1000 Mb/s
Poor 0-25 mb/s
Fair 25-50 mb/s
Good 50-100 mb/s
Very good 100-500 mb/s
Exceptional 500 mb/s above
IQB Score
Threshold
Download
Packet Loss
IQB score
0.73
Upload
Latency

IQB goals

- Shift the conversation around Internet Quality beyond speed
- Help decision-makers make sense of the data
- Empower users to make more informed decisions about their Internet
- Use existing, openly available datasets as complementary sources
- Advocate for the collection of more nuanced metrics

IQB current status

- IQB design report and executive summary (July 2025)
- IQB poster at ACM IMC 2025 conference (Oct 2025)
- **IQB phase 2: Development of IQB prototype** (Sept 2025 - Jan 2026)
  - Open-source code https://github.com/m-lab/iqb
  - Prototype v1 is online!
- **“IQB-Edu”: IQB for education** (Nov 2025 - …)

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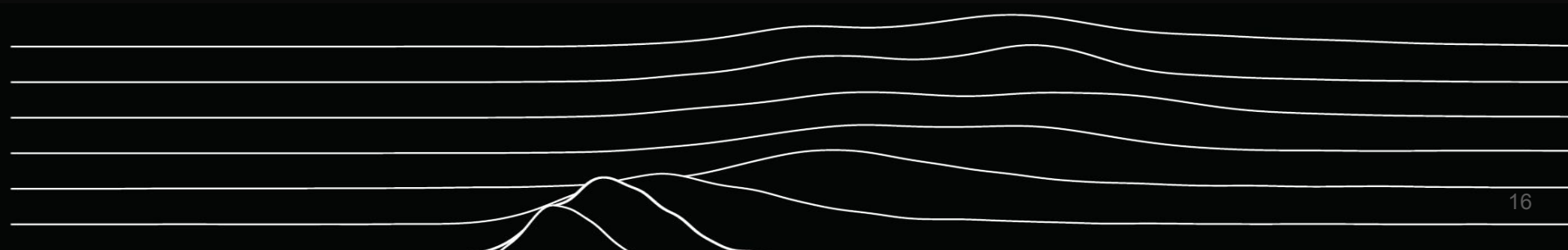
The IQB prototype



IQB prototype

Welcome to the IQB Prototype

This dashboard implements the Internet Quality Barometer framework, which assesses Internet quality beyond simple "speed" measurements by considering multiple use cases and their specific network requirements.

Current status: Under active development

🌐 Network Measurements

Input Mode

Simple Advanced

Enter your network measurements (applied to all datasets)

Download Speed (Mbps)

15.00

Upload Speed (Mbps)

20.00

Latency (ms)

75.00

Packet Loss (%)

Requirements Use Cases Full Hierarchy

Use Cases → Datasets

IQB prototype

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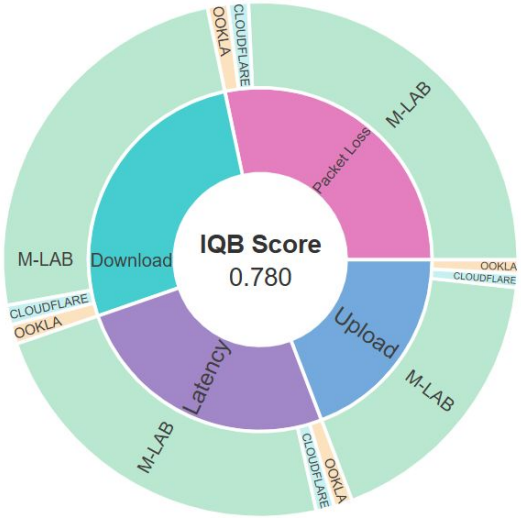
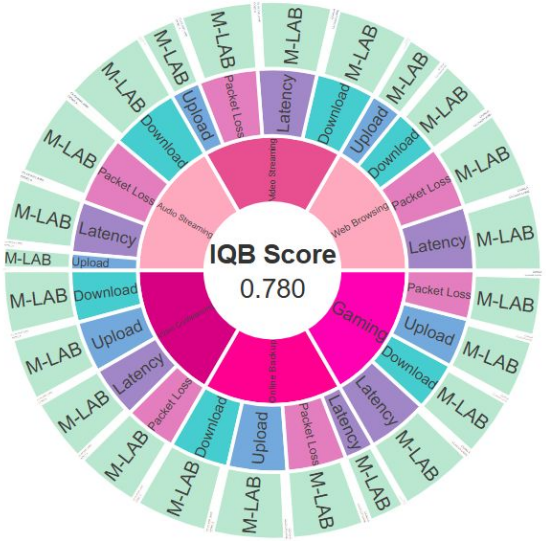
Requirements → Datasets

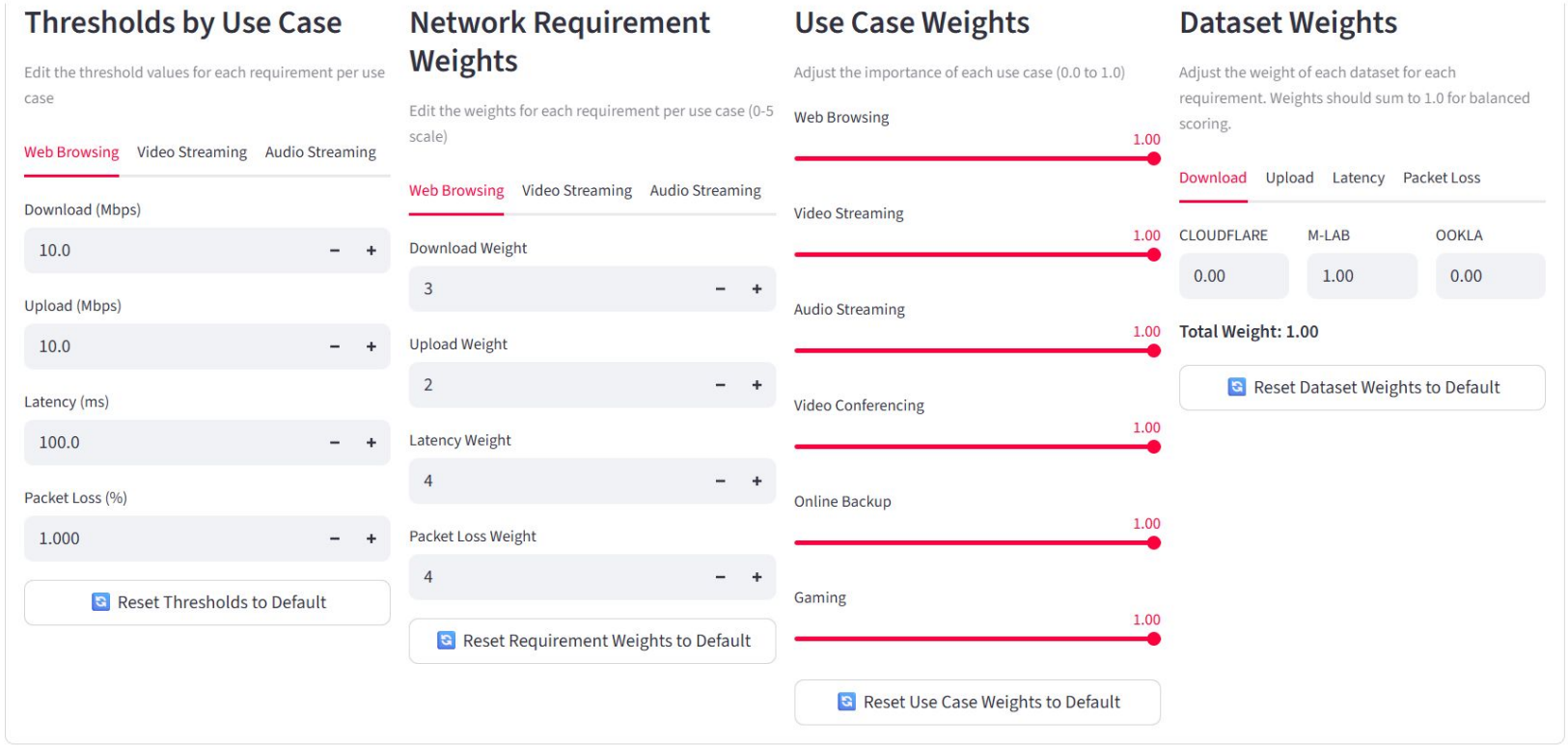


Use Cases → Datasets

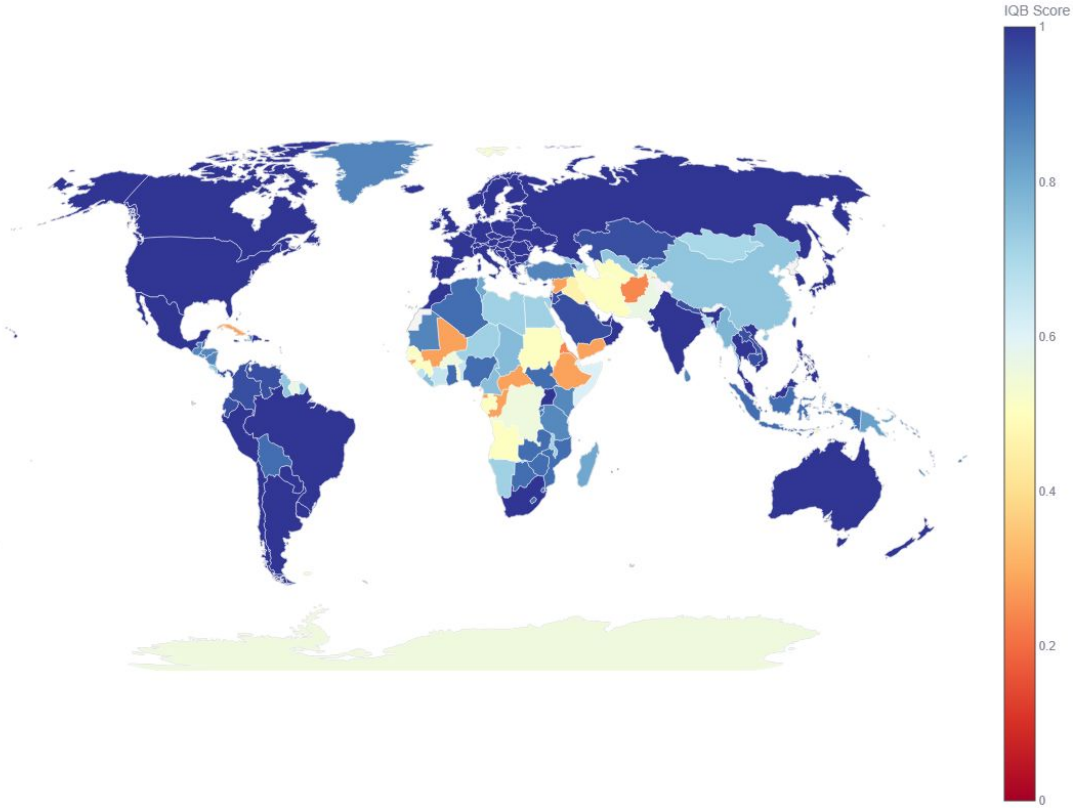
Use Cases → Requirements → Datasets



IQB prototype



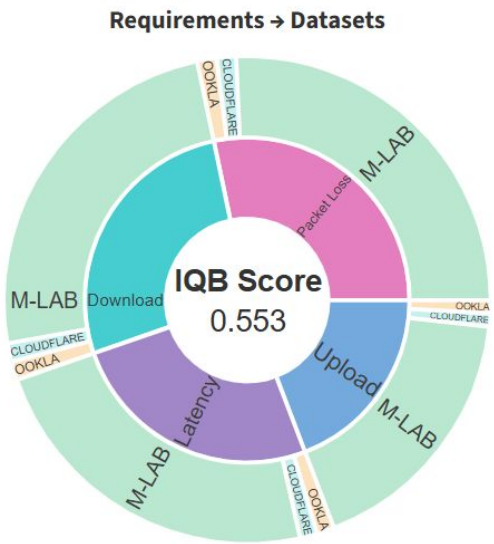
IQB prototype



IQB prototype

Congo, The Democratic Republic of the - IQB Score

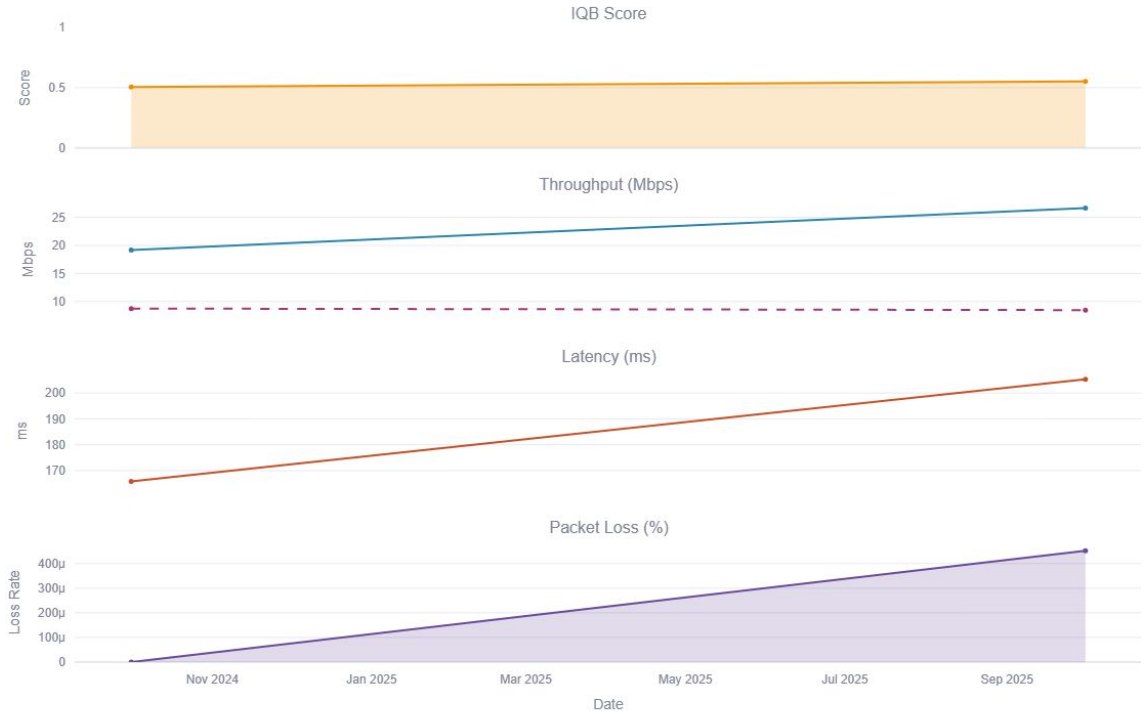
Requirements | Use Cases | Full Hierarchy



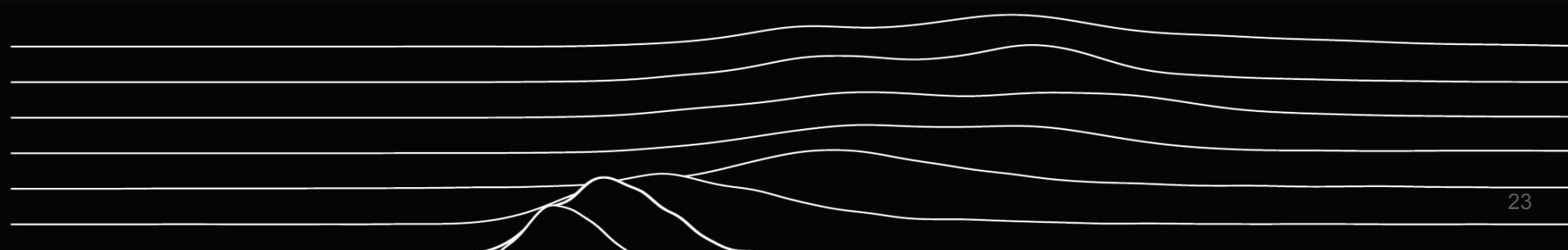
Raw Metrics

Percentile	Download (Mbps)	Upload (Mbps)	Latency (ms)	Packet Loss (%)
p1	0.11	0.03	505.25	0.3027
p5	0.36	0.20	367.89	0.2189
p10	1.00	0.70	352.21	0.1818
p25	3.56	1.79	299.47	0.0869
p50	9.66	3.90	252.67	0.0171
p75	26.68	8.47	205.26	0.0005
p90	40.44	12.63	49.36	0.0000
p95	55.58	19.47	28.07	0.0000
p99	116.88	41.68	19.00	0.0000

IQB prototype



IQB for Education (IQB-Edu)



IQB for Education (IQB-Edu)

Goal: Assess “good connectivity for pedagogical needs”

- **What?** → We don’t know (exactly)! We need to define it!
- **How?** → Using a customized version of the IQB framework
- **Why?** → To help decision making

IQB vs IQB-Edu

- Different context for connectivity: from user to facility
  - Speed tests per user vs per facility (multiple users and devices)
  - Facility characteristics/“profile”: type of connections, nominal bandwidth, number of students/users/computers
- Customization of IQB for education:
  - Different use cases
  - Different network requirements (per use case)
  - Different types of measurements / datasets
  - Different framework parameters (weights, thresholds, etc.)

IQB-Edu customization

- Use cases:
  - e.g., gaming is not a use case
  - new use cases, e.g., labs, group video conferencing
- Network requirements:
  - e.g., group video conferencing needs higher bandwidth
  - e.g., file transfer may be for smaller files
- Measurements / datasets:
  - Crowdsourcing (IQB) vs Regular (Giga Meter) tests:
    less measurements (robustness/statistical significance), but regular (aggregation thresholds)
  - Giga Meter uses M-Lab tests; what about other sources (Cloudflare, Ookla, Apple)?
- Parameter selection
  - IQB (v1) parametrized by experts; For IQB-Edu who are the experts? (niche domain for QoE)
  - Teachers not too tech savvy to provide feedback. How to collect feedback?

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Thank you!