

Cyberspace 2025: Today's Decisions, Tomorrow's Terrain

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Membayangkan Dunia Maya Pada Tahun 2025



- Microsoft merilis sebuah laporan baru yang berjudul “[Cyberspace 2025: Today's Decisions, Tomorrow's Terrain](#)” yang memprediksi trend teknologi di luar saat ini untuk mengantisipasi katalis perubahan masa depan di dunia maya.
- [Cloud computing, the Internet of Things, big data dan cybersecurity](#) menjadi topik besar agenda hari ini dan masa depan.
- Dalam laporan ada sebuah [Cyber 2025 Model](#), dikembangkan untuk menentukan tren potensi cyber, serta menunjukkan beberapa proyeksi yang menarik tentang masa depan tentang dunia maya. Sebagai contoh:

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- **Kesenjangan digital akan mengambil dimensi baru** dengan pertumbuhan dramatis di beberapa negara/regional berkembang (emerging country). Di India, misalnya, laporan memperkirakan pertumbuhan lebih dari 3.000 persen dalam jumlah total dalam berlangganan broadband, dari sekitar 20 juta tahun 2012 menjadi lebih dari 700 juta. Selama periode yang sama, di seluruh Uni Eropa penambahan langganan broadband baru hanya 105 juta, dari hampir 143 juta di 2012 hingga 248 juta pada tahun 2025.
- **Persentase kecil dari pekerja teknologi terampil akan mendorong inovasi bagi dunia yang sangat tergantung Internet.** Hasil analisis menunjukkan bahwa dengan hampir 5 miliar orang online dan puluhan miliar perangkat terhubung, namun hanya ada sekitar 16 juta lulusan dari program STEM (Sains, Teknologi, Engineering dan Math) per tahun untuk memajukan teknologi informasi dan komunikasi dan layanannya. Ketidakseimbangan dalam pendidikan ini akan memunculkan panggung persaingan sengit bagi bakat teknologi, dan persaingan ekonomi global.
- **Kekayaan tumbuh di negara-negara berkembang dan memperlambat di negara maju.** Model menunjukkan dua pergeseran kritis demografi yang diharapkan 2025, yaitu ketika negara-negara maju akan menghadapi cepat penuaan populasi dan menurunnya tingkat kelahiran, sementara negara-negara berkembang dapat mengharapkan lebih banyak orang dewasa usia kerja karena meningkatnya tingkat kelahiran.

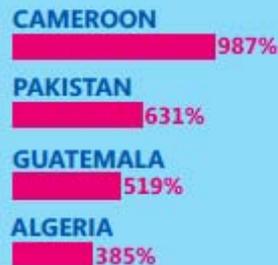
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QUANTIFYING THE WORLD IN 2025

HOW MANY INTERNET USERS WILL THERE BE IN 2025?



COUNTRIES EXPECTED TO SEE THE GREATEST INCREASE IN INTERNET USERS FROM 2012



WILL THE WORKFORCE KEEP UP WITH THE GROWING DEPENDENCE ON TECHNOLOGY?

ANNUAL STEM GRADUATES



By 2025, emerging economies will produce nearly 16 million graduates in science, technology, engineering, and mathematics (STEM) fields annually, which will be nearly 5 times greater than the 3.3 million per year from developed countries.

COUNTRIES WITH THE STRONGEST GROWTH IN STEM GRADUATES FROM 2013 (PERCENTAGE OF GROWTH)



HOW WILL THE WORLD MANAGE GROWING PUBLIC DEBT?



National debt as a percentage of GDP will average just over 10 percent worldwide, but some countries/regions will carry greater debt.



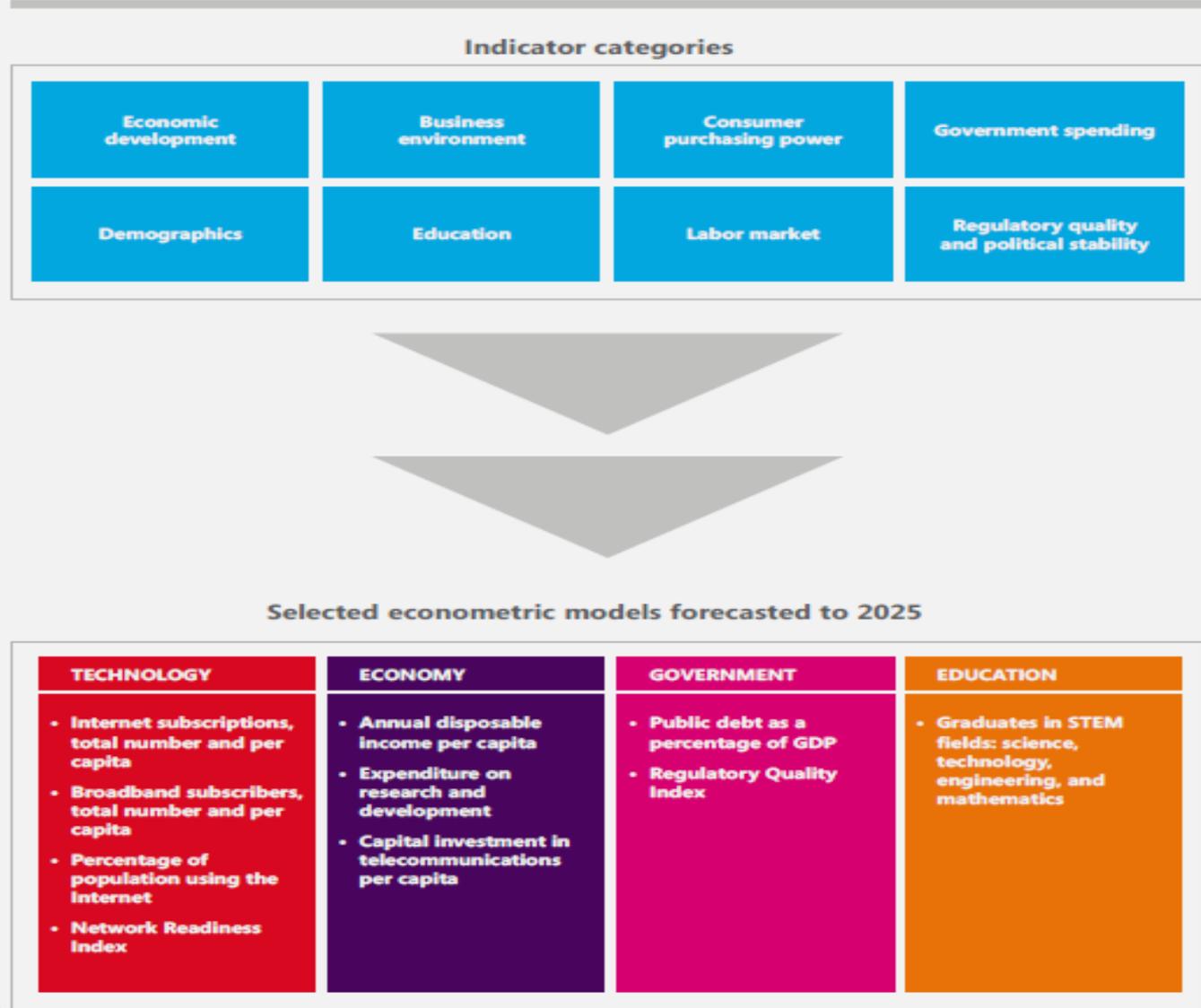
CAN THE WORLD DELIVER CONNECTIVITY FOR EVERYONE?

Broadband penetration will continue to increase, but gains will vary by country.



The Cyber 2025 Model

Figure 2: The Cyber 2025 Model: Delivering a Data-Driven View of the Future of Cyberspace



Future scenarios: Plateau, Peak, and Canyon

- Berdasarkan Cyber 2025 Model, teridentifikasi **tiga skenario masa depan** bahwa negara-negara/regional dapat mengalami apa yang kita sebut **Plateau, Peak dan Canyon**.
- Dalam setiap skenario ini, dikaji tantangan unik cybersecurity mereka yang cenderung muncul sebagai akibatnya. Sederhananya, tiga skenario masa depan dapat digambarkan sebagai berikut:
 - **Peak:** skenario ini mewakili sebuah dunia inovasi, di mana teknologi informasi dan komunikasi (ICT) memenuhi potensi untuk **memperkuat model** pemerintahan, ekonomi dan masyarakat
 - **Plateau:** skenario ini mewakili sebuah dunia "status quo", di mana kekuatan politik, ekonomi dan sosial **dapat meningkatkan maupun menghalangi kemajuan teknologi**
 - **Canyon:** skenario ini mewakili sebuah metafora untuk dunia yang terisolasi, yang dicirikan oleh **kebijakan pemerintah tidak jelas, tidak efektif dan standar, berakar dalam proteksionis**

Future scenarios: Plateau, Peak, and Canyon



Plateau

KEY CHARACTERISTICS	IMPACT ON TECHNOLOGY AND ECONOMIC DEVELOPMENT	CYBERSECURITY OUTLOOK
<ul style="list-style-type: none">• Inconsistent government policies and standards• Examples of cooperation in some areas but not others• Clusters of open trade and liberal rules for foreign direct investment, while other countries and regions remain closed• Varied levels of stakeholder participation and international cooperation	<ul style="list-style-type: none">• Economic and technology growth differ dramatically from country to country.• ICT development is supported in some countries and industries and not others.	<ul style="list-style-type: none">• Societies struggle with security challenges, as responses are often limited to individual nations or sectors despite the trans-border nature of Internet infrastructure.• Government focus is often on compliance over security.

PLATEAU FORECASTS BY THE NUMBERS

R&D investment in developed countries grows only **25 percent** between **2012** and **2025**, while the R&D investment of emerging economies **more than doubles** during the same period.

By **2025**, emerging economies experience a **sixfold increase** in **broadband penetration rates**, but still lag behind the penetration rate in developed countries.

Annual disposable income per capita grows **65 percent** in emerging economies, but even these impressive gains are approximately **10 percent** less than in the Peak outcome.

Peak

KEY CHARACTERISTICS	IMPACT ON TECHNOLOGY AND ECONOMIC DEVELOPMENT	CYBERSECURITY OUTLOOK
<ul style="list-style-type: none">• Clear, effective government policies and standards• Strong international and cross-sector relationships• Open trade and promotion of foreign direct investment• Multistakeholder and intergovernmental collaboration• Ability to attract and retain skilled workers to grow the economy	<ul style="list-style-type: none">• Accelerated economic and technology growth• Political, economic, and social support of ICT development	Society experiences the benefits of ICT with improved cybersecurity as a result of continual innovation and collaboration across industrial sectors and international borders.

PEAK FORECASTS BY THE NUMBERS

By **2025**, broadband penetration rates nearly equalize between developed and emerging economies.

Emerging economies overtake developed countries in their capital investment in telecommunications by a margin of **\$160 billion** to **\$153 billion**.

In Brazil, Russia, India, and China (BRIC countries), the annual disposable income per capita doubles between **2012** and **2025**, from **us\$3,085** to nearly **us\$6,400**.

Canyon

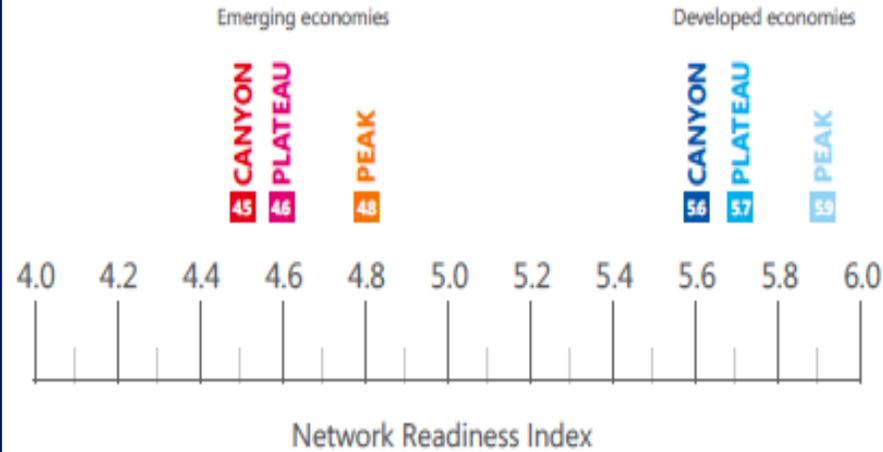
KEY CHARACTERISTICS	IMPACT ON TECHNOLOGY AND ECONOMIC DEVELOPMENT	CYBERSECURITY OUTLOOK
<ul style="list-style-type: none">• Unclear, ineffective government policies and standards• Protectionism inhibits cooperation• Significant restrictions on trade and foreign direct investment• Obstructive dynamics undermine internal and cross-country relationships	<ul style="list-style-type: none">• Economic and technology growth is slow; wide variance across countries results in extreme instability• Limited breadth of ICT adoption	<p>ICT adoption grows, but society is unable to fully benefit because of the unchecked growth of threats coupled with inadequate responses. Security approaches are overly prescriptive and often nationalistic, and do not respond adequately to changing technology or threat conditions.</p>

CANYON FORECASTS BY THE NUMBERS

In emerging economies, investment in R&D between **2012** and **2025** is **20 percent** of what could be achieved in the Peak scenario.

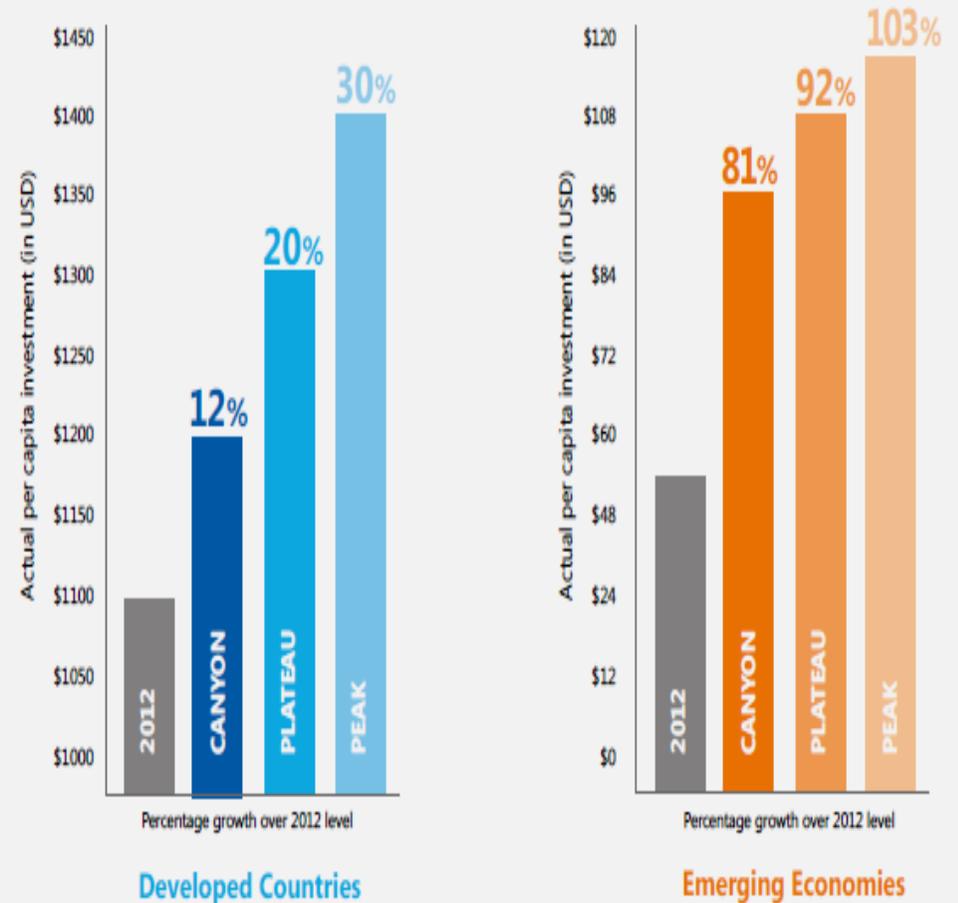
In developed countries, growth in annual income per capita between **2012** and **2025** is **10 percent**, only half of what could be achieved in the Peak scenario.

Figure 5. The Cyber 2025 Model: Projecting the Network Readiness Index in 2025



The Network Readiness Index of the World Economic Forum measures the readiness of an economy to take advantage of the benefits that ICT offers. The higher the score, the greater the readiness.

Figure 6. The Cyber 2025 Model: Projecting Growth in R&D Investment over 2012 Levels



Governments undermine ICT development

Public debt and low government productivity reduce the use of ICT

Figure 7. The Cyber 2025 Model: Public Debt as a Percentage of Total GDP, 1991–2025

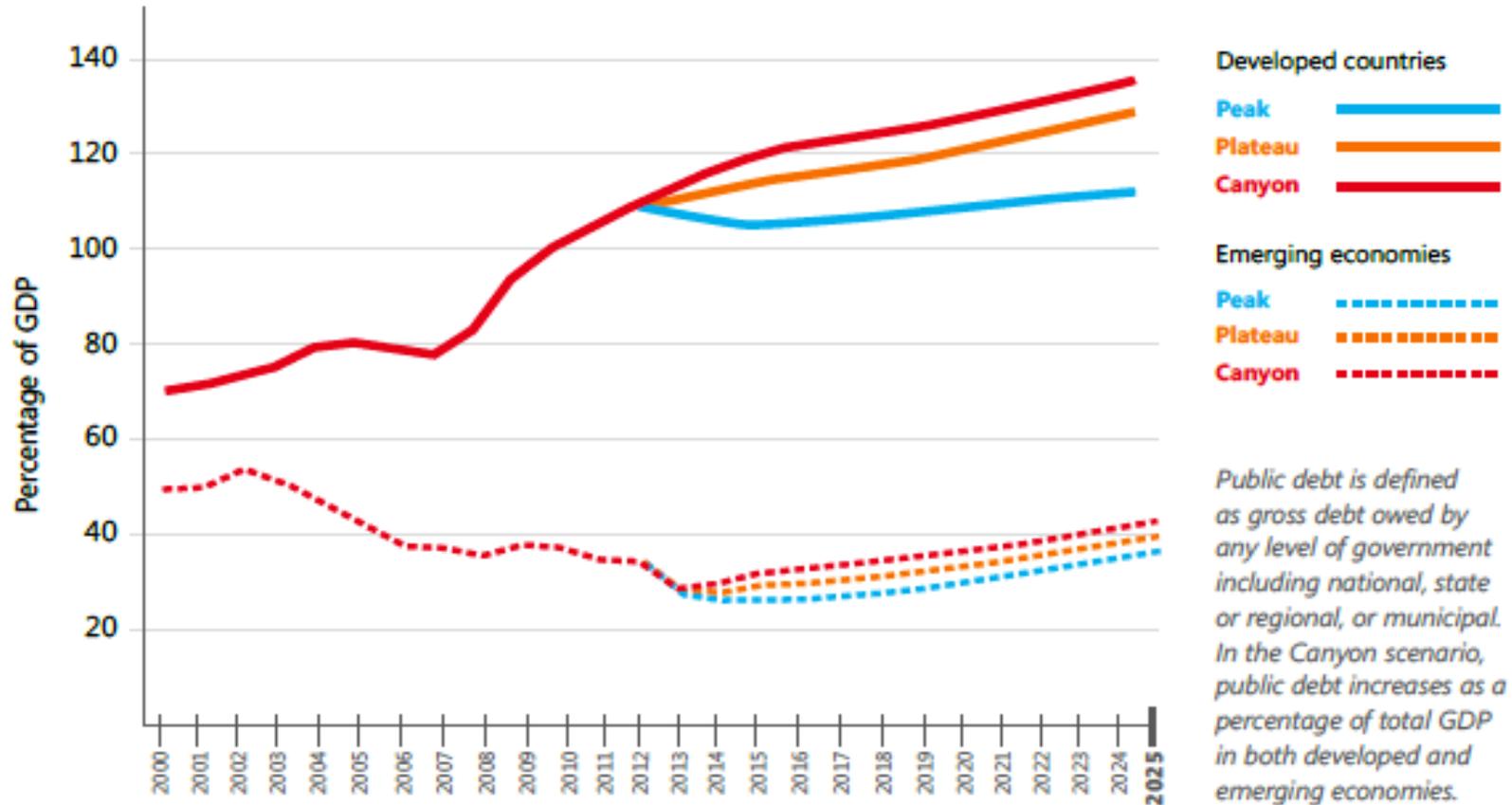
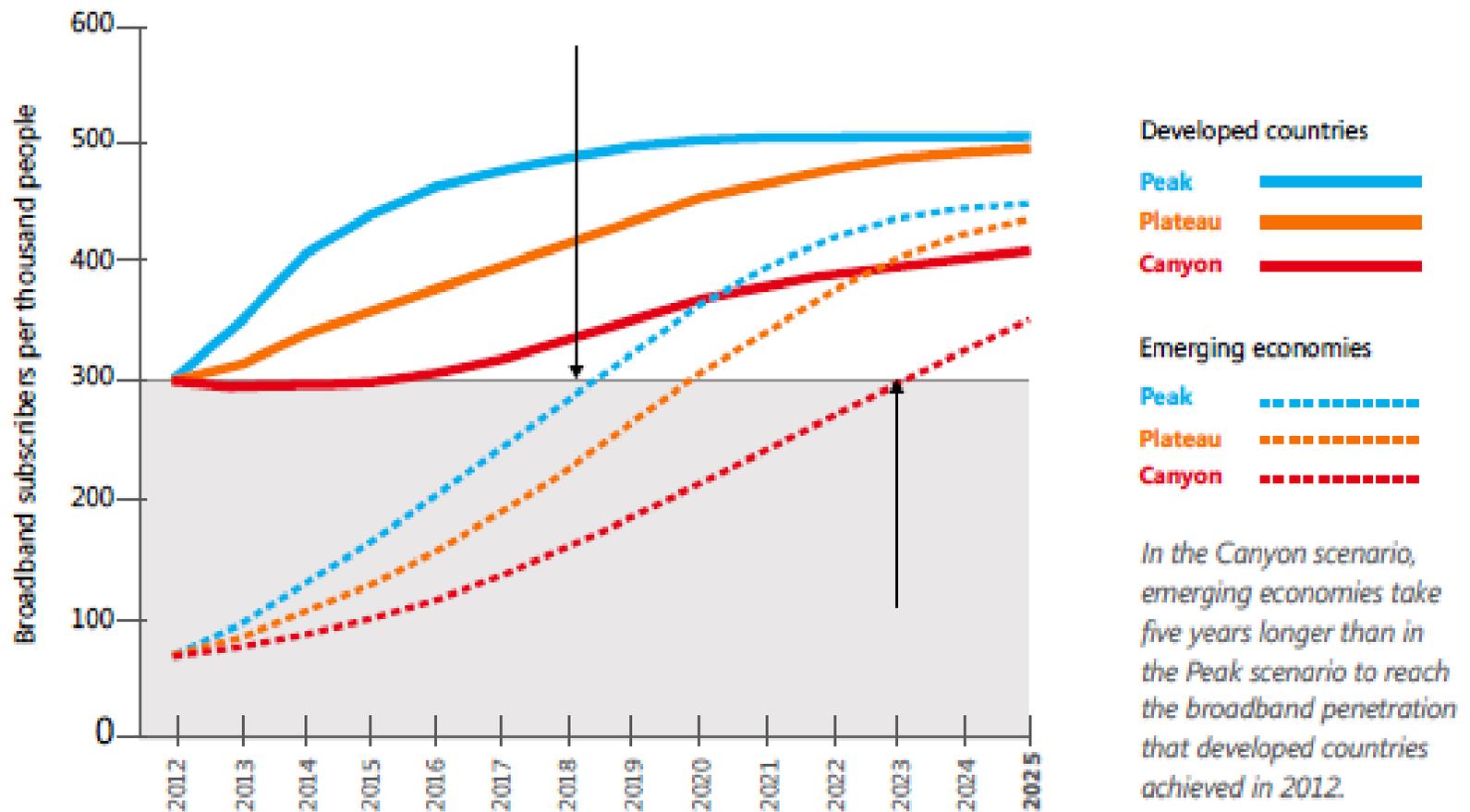


Figure 8. The Cyber 2025 Model: Projecting the Future of the Regulatory Quality Index



The Regulatory Quality Index, created by the World Economic Forum, captures perceptions of a government's ability to formulate and implement sound policies and regulations that permit and promote private sector development. Higher values correspond with better governance.

Figure 9. Cyber 2025 Model Projections: Broadband Subscribers per Capita, 2012–2025



Rekomendasi

- Laporan ini dimaksudkan untuk memicu dialog, perdebatan dan pemahaman yang lebih tentang tantangan dan peluang yang ada di hadapan dan cara untuk mendapatkan keuntungan darinya. Para pemangku kepentingan di sektor publik maupun swasta disarankan untuk memprioritaskan upaya berikut:
 - Pengembangan model tata kelola yang menetapkan arah kebijakan yang jelas dan menyediakan kerangka kerja cybersecurity negara/regional. Idealnya, model tata kelola harus mencakup komitmen **untuk Internet terbuka dan gratis Internet namun privasi dilindungi; Harmonisasi hukum dan standar dengan badan internasional dan pemerintah asing; dan mendukung perdagangan bebas.**
 - Memungkinkan pengembangan bakat **melalui investasi strategis pada infrastruktur, penelitian dan pengembangan.** Investasi ini harus menyeimbangkan kebutuhan untuk mobilitas bakat dan bakat retensi, dengan penekanan pada **pendidikan tenaga kerja modern yang mampu mempertahankan inovasi.**
 - Kerjasama global yang mendorong manajemen dan koordinasi risiko cybersecurity di antara para pemangku kepentingan baik domestik maupun internasional, dengan fokus bekerjasama dengan pemerintah lainnya untuk **mengembangkan norma-norma cybersecurity yang mendukung stabilitas dan keamanan di dunia maya.**

Summary of scenario forecasts

The table below summarizes select forecast elements from the Cyber 2025 Model for key metrics in the areas of technology, economy, government, and education and their change from 2012.

		ECONOMIES	PEAK	PLATEAU	CANYON
TECHNOLOGY	Broadband Internet subscriptions per capita	Developed	.496 67% CHANGE	.491 65% CHANGE	.412 39% CHANGE
		Emerging	.441 538% CHANGE	.431 65% CHANGE	.344 397% CHANGE
	Mobile Internet subscriptions per capita	Developed	1.126 60% CHANGE	1.024 45% CHANGE	.960 36% CHANGE
		Emerging	.766 403% CHANGE	.531 249% CHANGE	.499 227% CHANGE
ECONOMY	Annual disposable income	Developed	US\$5.8B 26% CHANGE	US\$34.6B 19% CHANGE	US\$32.6B 12% CHANGE
		Emerging	US\$5.8B 81% CHANGE	US\$5.5B 73% CHANGE	US\$5.3B 65% CHANGE
	Expenditure on R&D per capita	Developed	US\$1,429 30% CHANGE	US\$1,329 20% CHANGE	US\$1,231 12% CHANGE
		Emerging	US\$114 103% CHANGE	US\$108 92% CHANGE	US\$101 81% CHANGE

Summary of scenario forecasts

GOVERNMENT	Public debt as a percentage of GDP	Developed	112% 2% CHANGE	130% 19% CHANGE	136% 24% CHANGE
		Emerging	36% 7% CHANGE	40% 15% CHANGE	43% 25% CHANGE
	Regulatory Quality Index score	Developed	1.41 8% CHANGE	1.36 3% CHANGE	1.30 -1% CHANGE
		Emerging	-0.12 53% CHANGE	-0.16 33% CHANGE	-0.21 13% CHANGE
EDUCATION	STEM graduates per 1,000 people	Developed	3.12 63% CHANGE	3.05 59% CHANGE	2.98 56% CHANGE
		Emerging	3.02 87% CHANGE	2.88 79% CHANGE	2.78 73% CHANGE



Tanya Jawab



The End