Coding bootcamps:

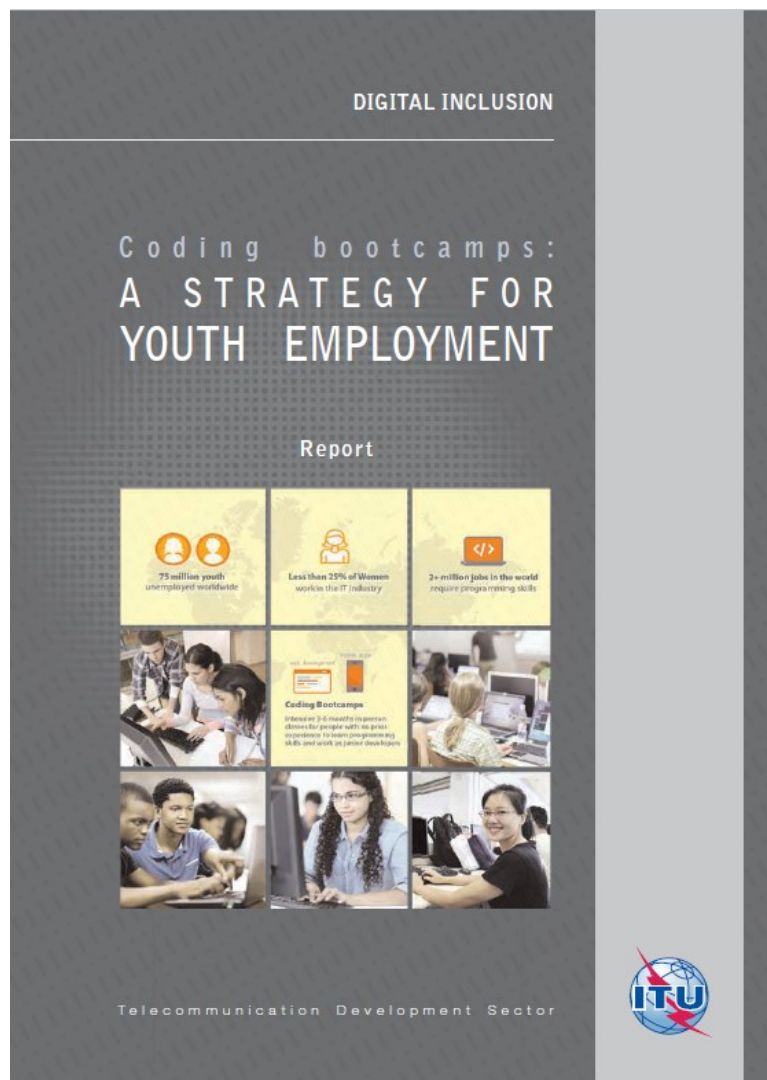## A strategy for youth employment in developing countries

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ITU Report on Coding Bootcamps: A Strategy for Youth Employment

Research Objectives

- Map recent **emergence of coding bootcamps** in middle and low income countries.

- **Assess training program elements** and how they contribute to learning and employment outcomes.

- **Draw a list of recommendations** for the United Nations ITU and its members.

Methodology

- **Desk research** (websites, media) 40 coding bootcamp providers.

- **Interviews with 25 providers** in Africa, Asia, and Latin America

  - ❖ Characteristics of training programs

  - ❖ Employment services

  - ❖ Partnerships

  - ❖ Challenges

What is a coding bootcamp?

mobile apps

web development

Coding Bootcamps

Intensive 3-6 months in person classes for people with no prior experience to learn programming skills and work as junior developers

Learning to code: A new path to employment

- Code governs what computers do.

- Computer science degrees still the gold standard to become a software developer.

- New form of rapid skills training opens doors for people with non-technical background to become technology creators.

- For women and young girls, coding bootcamps offer a new path for professional development.

- Coding skills can help modernize youth labor force in less developed countries.

Context in which they emerged

Emerged in 2011 in the United States as a response to two trends:

1. An increase demand for software developers across all economic sectors.

2. A slow or inadequate evolution of computer science curriculum in formal education institutions to graduate developers at the speed demanded by the industry.

A nascent training industry that continues to grow

- Today, over 67 coding bootcamp providers currently operate in US and Canada alone.

- Over 16,000 students graduated in 2015, 75% of which found a full time job.

- Women make up almost 40% of the student population in some coding bootcamps.

- Spreading also throughout less-developed regions of the world.

We analyzed 12 popular programs for learning how to code. Each group of programs focuses on a different outcome. Finding a program that fits your goals is the first step to figuring out what type of program you should choose.

Land a job as a junior developer

Hack together my own ideas

Learn the basics of web development

Developer

Junior Dev

Hobbyist

Hacker

Tinkerer

Beginner

Hours of practice

GOAL: LEARN THE BASICS

code Codecademy | ◇ Code School
Treehouse | ∞ Coursera

GOAL: HACK TOGETHER IDEAS

U Udacity | Tealeaf Academy
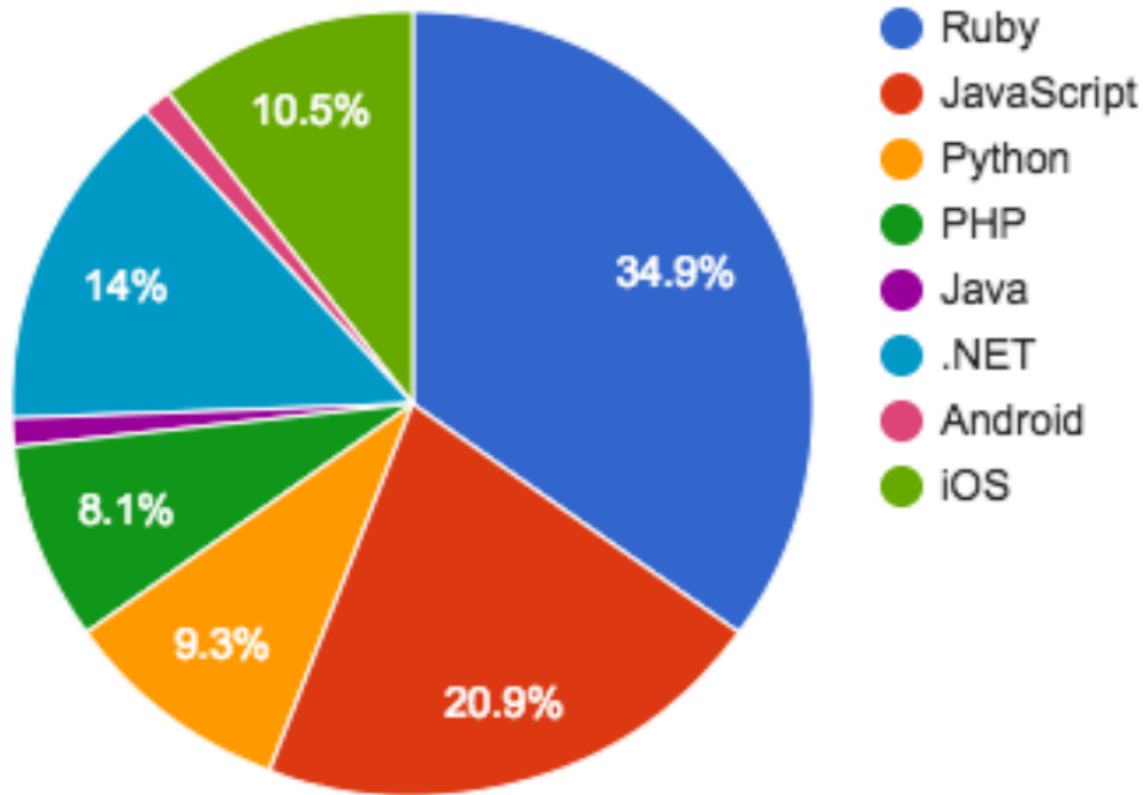T Thinkful | B Bloc's Rails Course

GOAL: GET A JOB

Hack Reactor | GA General Assembly
Dev Bootcamp | B Bloc's Full Stack Track

Source: loc.io

Most popular programming languages

Table 3: Top Teaching Languages

- Ruby — 34.9%
- JavaScript — 20.9%
- Python — 9.3%
- PHP — 8.1%
- Java
- .NET — 14%
- Android
- iOS — 10.5%

Course Report (2015)

Youth employment outlook

2+ million jobs in the world
require programming skills

75 million youth
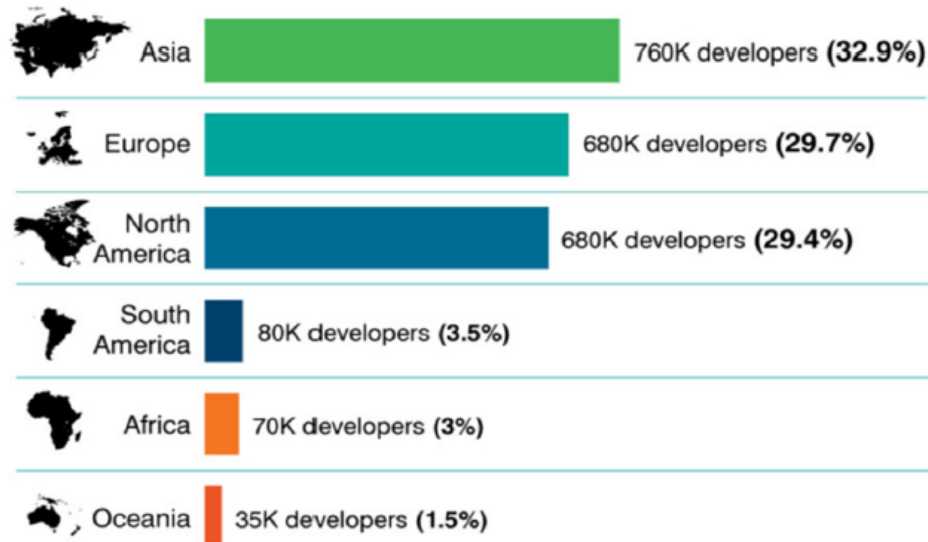unemployed worldwide

web development

mobile apps

Coding Bootcamps

Intensive 3-6 months in person
classes for people with no prior
experience to learn programming
skills and work as junior developers

Less than 25% of Women
work in the IT industry

ITU

IT industry employment outlook

Figure 5: Number of application developers by region 2014

APP DEVELOPERS SPREAD ACROSS THREE CONTINENTS
% of developers based in each region (n=7,149)

Asia — 760K developers (32.9%)
Europe — 680K developers (29.7%)
North America — 680K developers (29.4%)
South America — 80K developers (3.5%)
Africa — 70K developers (3%)
Oceania — 35K developers (1.5%)

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Source: Developer Economics Q1 2014 | www.DeveloperEconomics.com/go

Source: Developer Economics[31]

Coding Bootcamp Landscape in less-developed countries

- **READY-TO-WORK CODING BOOTCAMPS**: **traditional approach to coding bootcamps** - intensive 12-20 weeks full or part-time rapid skills training programs that prepare people to find employment shortly after the training ends (usually within 3 months).

- **BOOTCAMP+ MODEL:** extended training approach - longer training programs (1-2 years) that equip students with a broader range of sustainable income-generation skills in addition to coding competencies. **Found mainly in Africa, many of them focus on adding entrepreneurship training.**

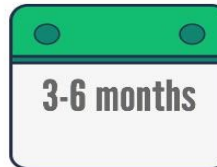# Coding Bootcamp Landscape in less-developed countries

- **MINI-BOOTCAMP MODEL: short-term training programs** ranging in length from two days to one month. Typically designed to spark interest in learning the basics of programming, to recruit or identify talent, for professionals to update their skills, and for outreach and community building.

- **EARLY-EDUCATION MODEL: efforts to trigger interest in programming at an early age**. This model includes workshops, hackathons, and online platforms as well as more encompassing efforts such as schools integrating coding skills into their curriculum.
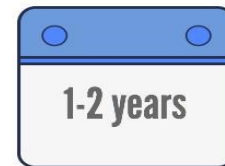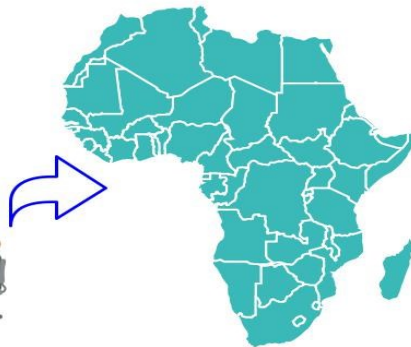
Coding bootcamp models in developing countries

Ready-to-Work

Intensive, full and part time in-person training in different programming languages

Job services

TRAINING LENGHT

3-6 months

TYPES OF JOBS

Junior Developer

Free lance

SALARY USD*

10,000 - 13,000

Not available

Bootcamp+

Programming languages + communication, entrepreneurship and life skills

1-2 years

Junior Developer

Free lance

Entrepreneur

9,000 - 15,000

*Source: Salary ranges based on HongKiat database of salaries for junior web and mobile app developers in selected countries   not on data from coding bootcamps profiled for this research.

CB models as employability strategy

Ready-to-Work

Intensive, full and part time in-person training in different programming languages

+

Job services

Bootcamp +

Programming languages + communication, entrepreneurship and life skills +

EARLY-EDUCATION MODEL

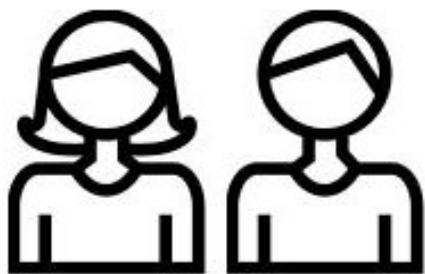**MINI-BOOTCAMP MODEL**

Short Term   Medium Term   Long-term

Employability Strategy

Who are the students?

Coding Bootcamp Student Profile in organizations interviewed

25-35 Years Old

25-40% are women

Most with University Degree + some professional experience

Also, recent graduates, working professionals, & entrepreners

:e: Interviews with coding bootcamp providers between October and November 2015

Business Models

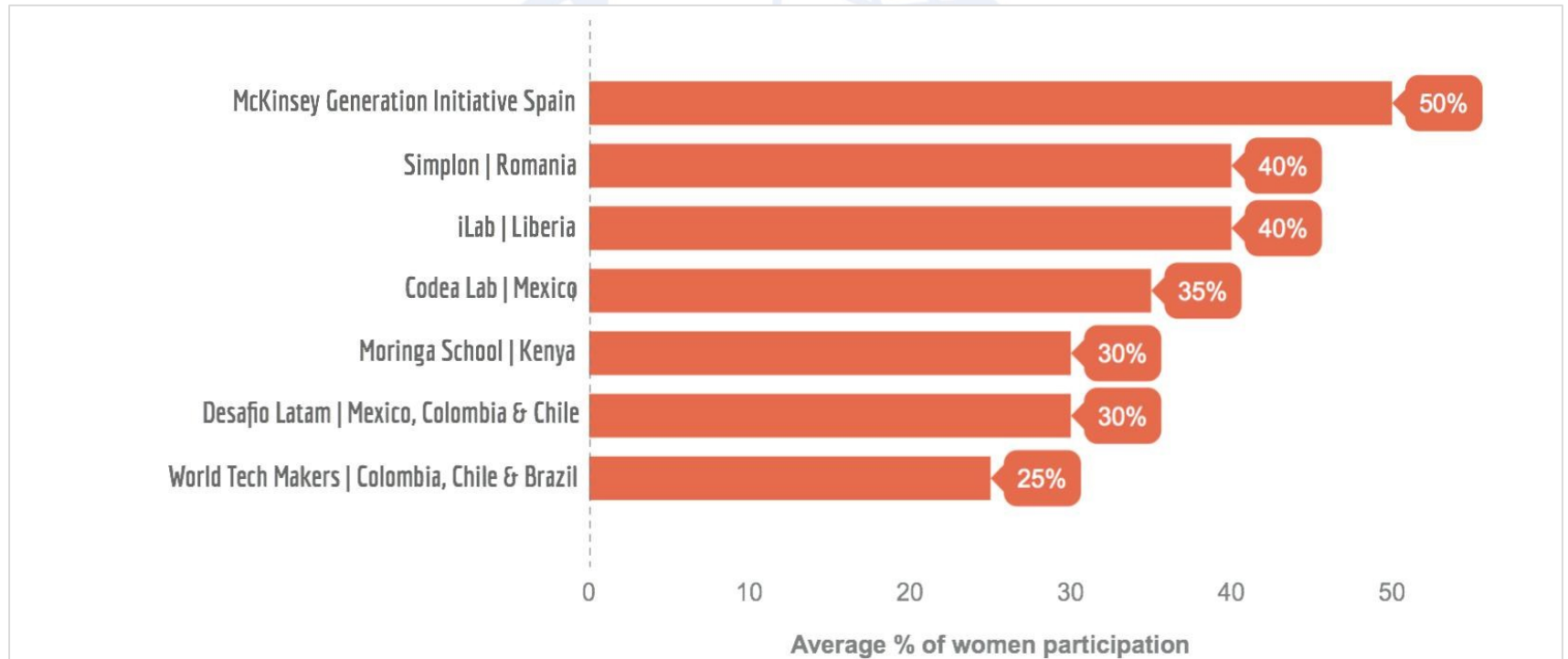| Types of organizations	Revenue Streams
1. **Commercial organizations** 2. **Social enterprises** 3. **Non-profit organizations**	❖ **Student tuition** ❖ **Student contribution to the organization after they are employed** ❖ **Employer hiring fees** ❖ **Startup accelerators** ❖ **In-house recruiting** ❖ **Licensing curriculum** ❖ **Donations [cash or in kind]**

Promotion & recruitment process

Rigorous student screening process

1. Programs **publicized through diverse means** including mini bootcamps (workshops, hackathons, websites, social media, etc.).

2. Prospective students **complete an application form** with basic information explaining motivation for applying and professional aspirations.

3. **Applicants take a logic test and a programming challenge** (often from Codecademy).

4. **Selected applicants are invited for an interview** to further assess motivation, discipline, soft skills, and their career objectives. These interviews usually happen face-to-face.

Women participating in coding bootcamps

Organization	Average % of women participation
McKinsey Generation Initiative Spain	50%
Simplon | Romania	40%
iLab | Liberia	40%
Codea Lab | Mexico	35%
Moringa School | Kenya	30%
Desafio Latam | Mexico, Colombia & Chile	30%
World Tech Makers | Colombia, Chile & Brazil	25%

Average % of women participation

Data provided by organizations during the interviews. Percentages vary depending on student cohort, type of training and country for organizations with multiple locations

Strategies to increase women's participation

1. Awareness-raising

❖ **Organizing mini-bootcamps**, day or weekend coding workshops that bring in women from the tech industry to act as role models and mentors, and to build a supportive community

2. Program Design

❖ **Sponsorship to cover tuition** cost, including in some cases a stipend for living expenses where programs require full time commitment.

❖ **Part time programs** that enable women to enroll while keeping their responsibilities as homemakers and/or income providers for their family.

Cost and financing mechanisms

Programs costs vary widely, some are free or subsidized

❖ Student's personal funds

❖ Free (scholarships for all participants)

❖ Scholarships for select participants

❖ Tuition waivers

❖ Deferred payments – monthly installments over a two or four-year period

❖ Discounts for early registration or full payment

❖ Payment through credit agency partners

❖ Monthly payments of a % of salary to cover cost

❖ Graduate supports organization's next training sessions.

❖ Graduate receives some money back after completing training

❖ Graduate receives some money back when they get a job

Employment Strategies

Comprehensive basket of job services

IMMEDIATE EMPLOYMENT

- Internal placement in bootcamps that run their own web development, mobile app development, or other digital services agency.

- Internships built into the actual training program

INTRODUCTION TO POTENTIAL EMPLOYERS

- Connection to potential employers through career fairs, sharing job openings, project demonstration with potential employers, among others.

- Marketplace for developers to sell their app products.

JOB HUNTING SKILLS TRAINING AND MENTORSHIP

- Development of project portfolio and CV, and an online platform to share this portfolio.

- Mentorship and coaching for interviews and salary negotiation. Soft skills training (communication and public speaking skills)

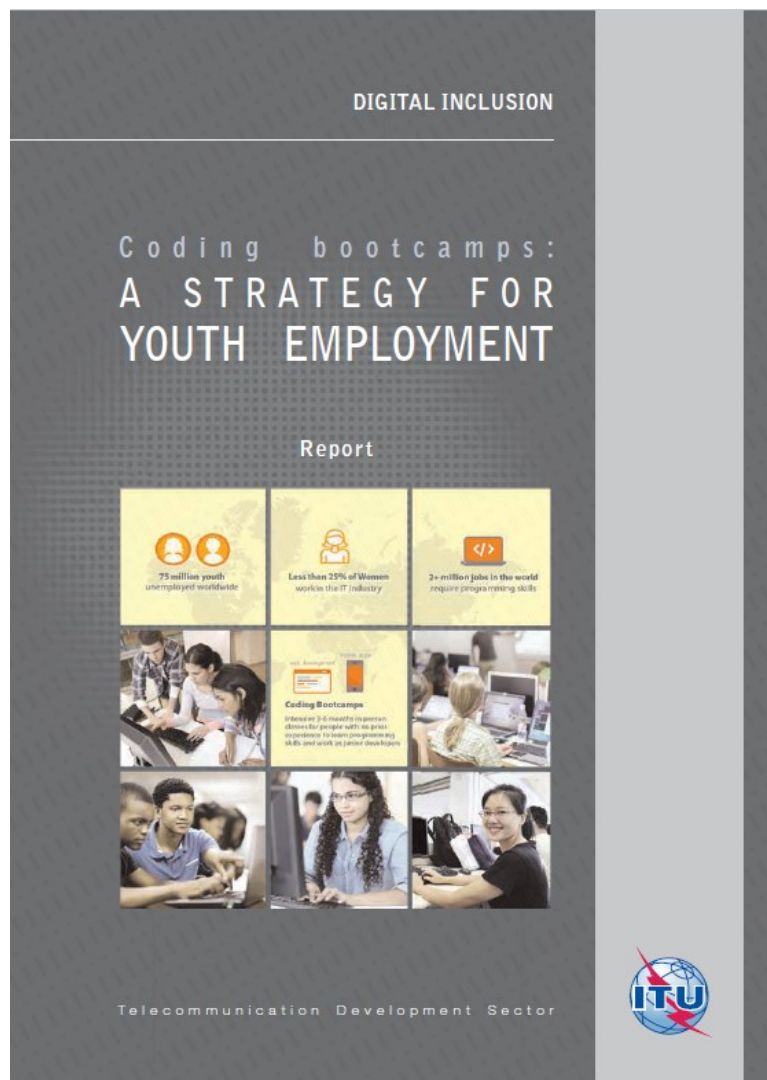# Coding bootcamps as employment strategy for youth

Considerations for policy and program development:

❖ The coding skills shortage is predicted to run through at least 2020. **Opportunity to impact unemployment** by using the bootcamp approach to equip youth of today with job-relevant skills to fill the shortfall.

❖ **Coding bootcamps vary in career outcomes** depending on length, training format and content.

❖ The concept **of bootcamp must be scoped appropriately** based on population targeted.

❖ **Bootcamp success** designed to prepare youth to work in the domestic market often **hinges on existence of a strong tech ecosystem**.

❖ Linked to tech ecosystems, **bootcamps are currently mainly found in urban settings.**

Recommendations and next steps

- **Raise awareness about current trends in coding bootcamps**

  - This youth employment strategy is either unknown or misunderstood (different players use the term "bootcamp" interchangeably for ready-to-work and mini bootcamp models) but holds great promise because it trains people for existing jobs.

- **Identify new stakeholders who could launch bootcamps**: tech hubs, incubators, co-working spaces, telecentres, etc.

- **Develop standards for publishing verified coding bootcamp completion and employment outcomes** – e.g. NESTA model as well as accreditation systems, e.g. mapped to existing vocational qualifications – Australia model

- **Train interested stakeholders on coding bootcamp methods, management and training models** – ITU is developing such training

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For more information contact ITU Special Initiatives Division
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