THE PAST, THE PRESENT AND THE FUTURE OF KRISS

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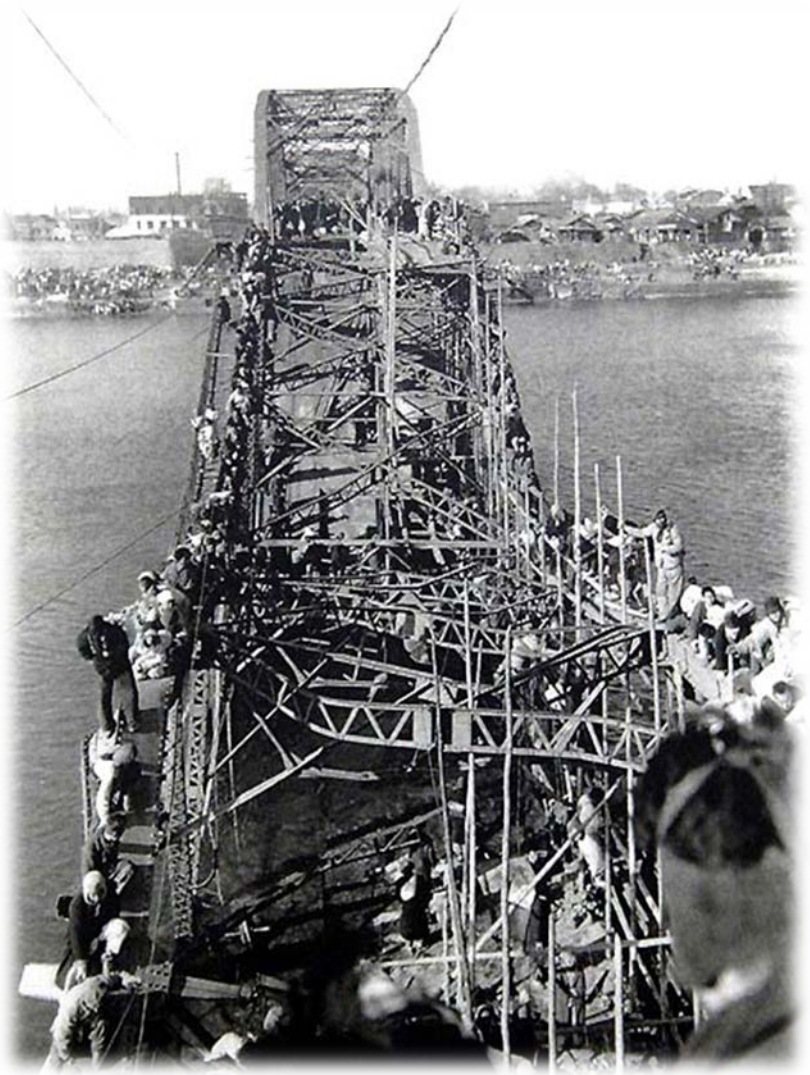
CONTENTS

KOREA AFTER THE WAR



KOREAN WAR

- Broke out in 1950 and lasted for 3 years
- Burnt almost everything to ashes and left nothing

DOWNTOWN OF SEOUL (1)

1950s

Now

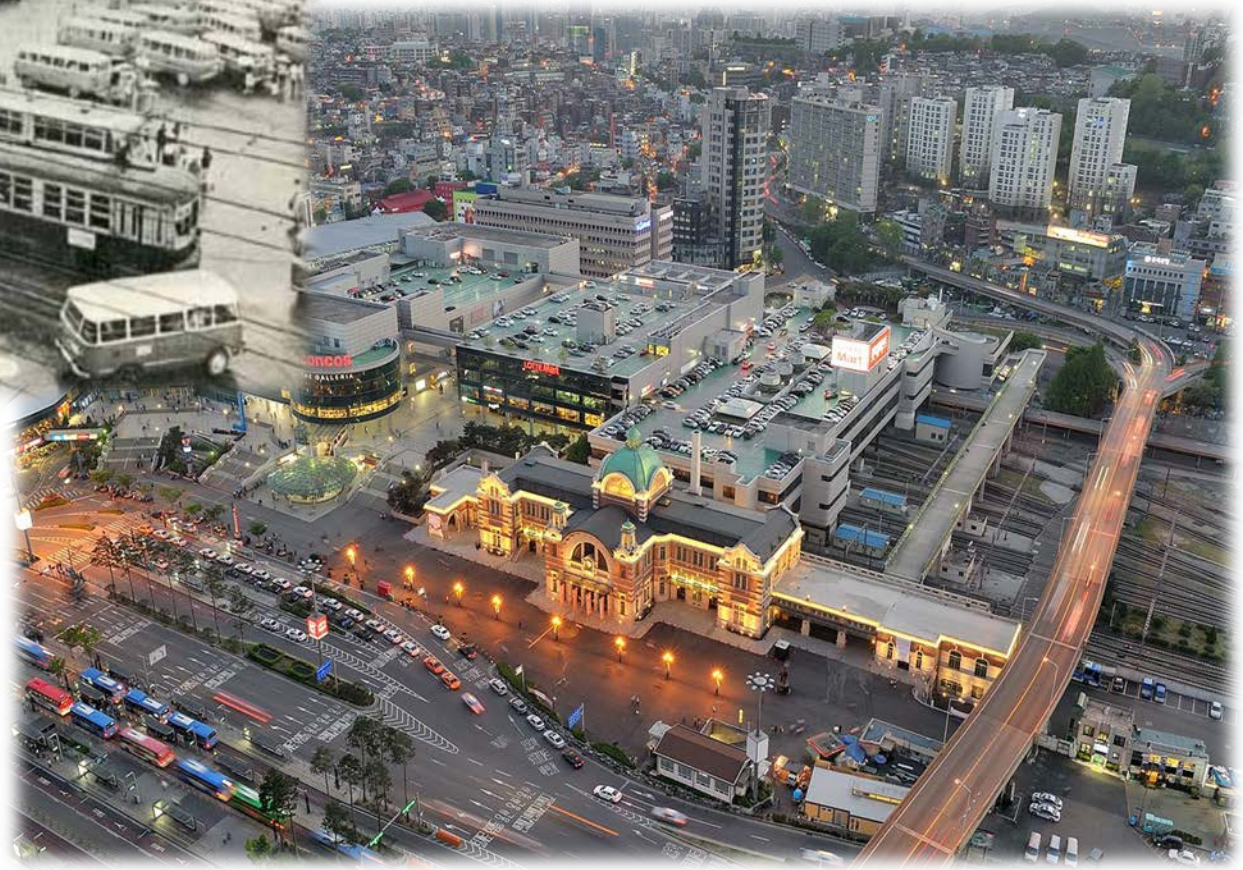
DOWNTOWN OF SEOUL (2)

1950s

Now

SEOUL RAILWAY STATION

1950s



Now

DAEJEON

1950s

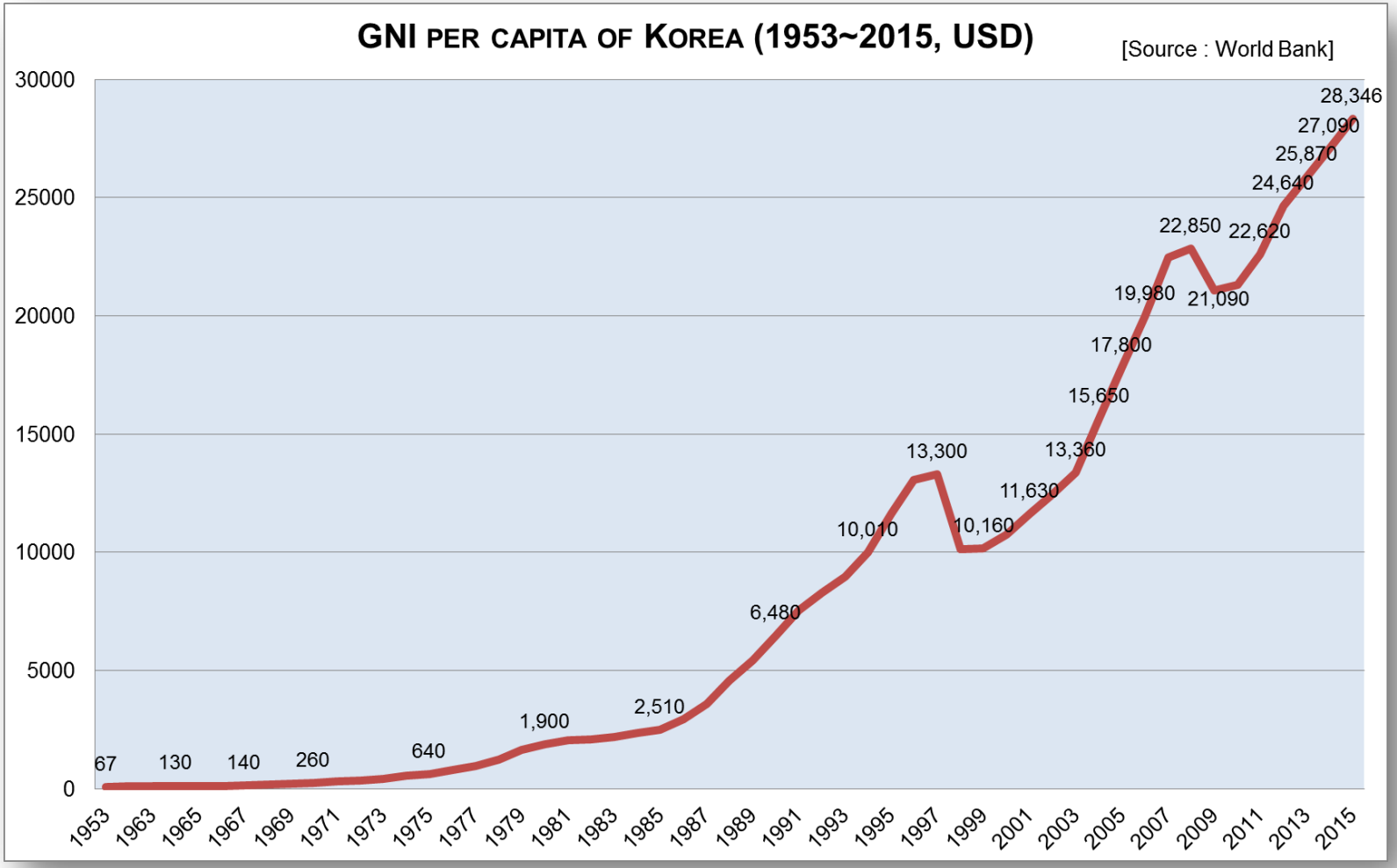
Now

SCHOOL AND HOSPITAL

1950s

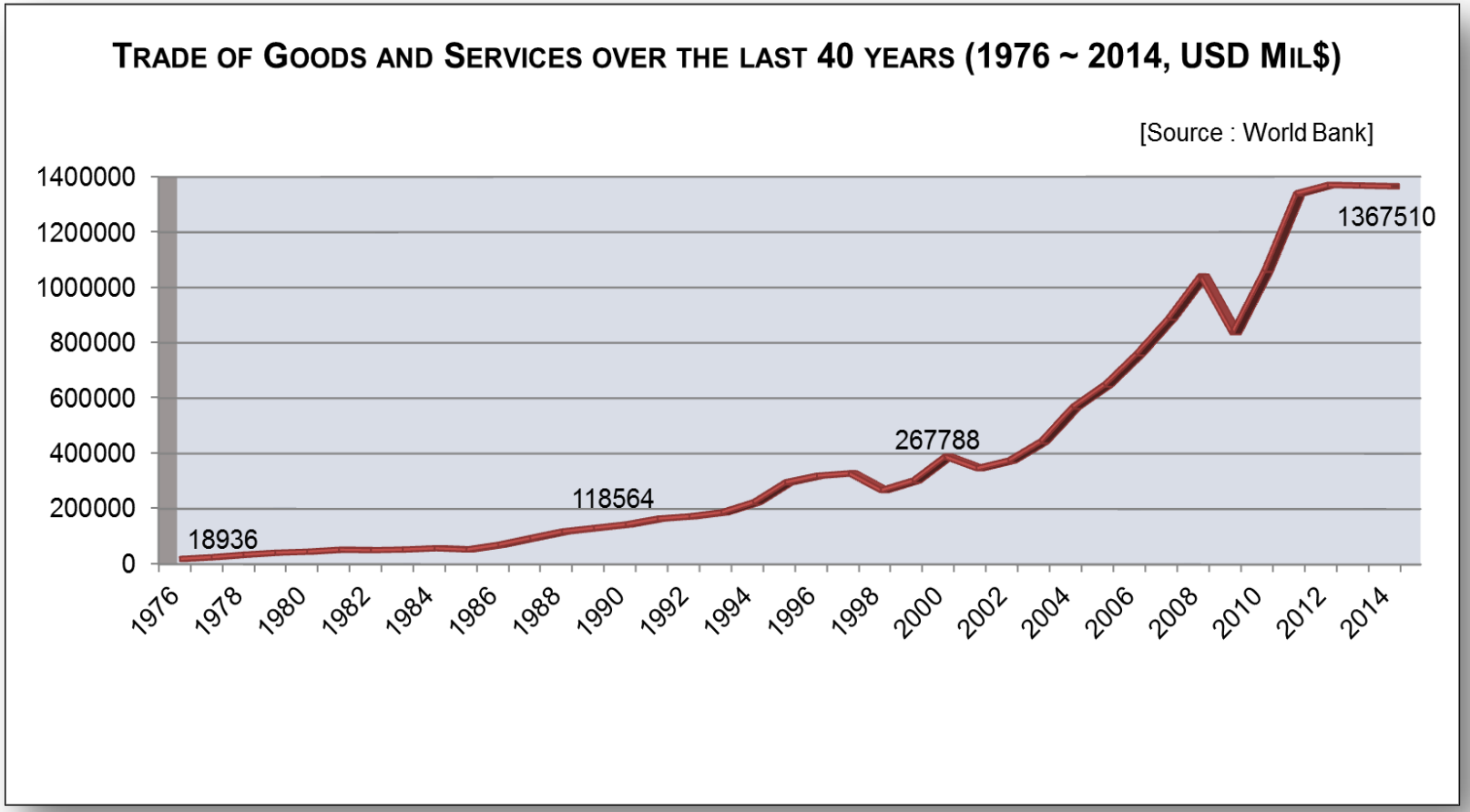
Now

ECONOMIC GROWTH (GNI PER CAPITA)



- GNI per capita in 1953 : US$67 (2nd lowest in the world)
- GNI per capita in 2015 : US$28,346 (increased to 423 times and ranks 28th in the world)

ECONOMIC GROWTH (TRADE VOLUME)



- Trade increased more than 70 times compared with that in 1976 when Korea started industrialization (8th largest country in trade volume)
  - ☞ *From simple manufactures (textiles, wig, shoes, iron ore, plywood, etc.) to high-tech products (automobile, semiconductors, computer, electronics, chemicals, etc.)*

What made it possible?

KEY FACTORS OF THE KOREAN SUCCESS

ASSISTANCES FROM ABROAD AFTER THE WAR

- In-kind contributions and grants by USA, Germany, Japan, etc.
- Development assistance loans by USAID, IBRD, ADB, etc.

GOVERNMENT'S STRONG WILL TO SUPPORT S&T

- **5-year S&T Development Plans** for 25 years from 1962 to 1987 in conjunction with the National Economic Development Plan (Establishment of many GRIs)
  - ☞ *As of 2013, R&D Expenditure of Korea is **4.15 % of GDP** which is the 2nd highest in the world (total amount of USD 60 billions - 6th largest following USA, China, Japan, Germany, France)*

EXCELLENT HUMAN RESOURCES (ENTHUSIASM FOR EDUCATION)

- Education is one of the powerful instrument to lay a foundation for Korean sustained economic growth
  - ☞ *As of 2014, the **Gross Enrollment Ratio(GER) for secondary education (middle and high school) is 98 %** and the **GER for tertiary education (college/university) is 95 %***

II. KRISS OVER THE LAST 40 YEARS

1) EARLY STAGE (1970s ~ 1980s)

- Establishment of KSRI and its research infrastructure with the help of developed countries/NMIs
- Beginning technical services to meet the needs of industries
- Laying the foundation of cooperation with international metrology communities

2) GROWTH (1990s ~ 2000s)

1) TOWARD A LEADING NMI (2010s ~)

EARLY STAGE OF KRISS (1970S ~ 1980S)

ASSISTANCE FROM USA

- Donation of sets of standard prototypes (mass, length and volume) by US President Lyndon Johnson in 1966
  - ☞ *Korean Government recognized the importance of metrology for the development of economy.*
- NIST (then the NBS) and the US GE TEMPO survey teams (in 1967, 1972, and 1975) recommended the establishment of a national standards system and the 'Korea Standards Research Institute (KSRI)'.
- The US AID loan (USD 5 million, '75~'80)/the ADB loan (USD 8 million, '78~'81) for purchase of research equipment

[Visit of President Johnson to Korea in 1966]

[Loan agreement ceremony with US AID in 1975]

ESTABLISHMENT OF KSRI

- Legally established in Dec.1975 and building construction began from 1976.

[Site of the KSRI in early 1970]

[Ground-breaking ceremony]

[Construction began in 1976]

ASSISTANCES FROM GERMANY AND JAPAN

- **Technical cooperation program between Korea and Germany**
  - Duration : 1979~1994 (1st phase 1979~1982, 2nd phase 1985~1989, 3rd phase 1989~1994)
  - Total amount : USD 3 million approx. (DM 7,240,000)
  - Technical consultations by German experts, training of KSRI researchers, purchase of equipment
- **Loan by Japanese Overseas Economic Cooperation Fund (OECF)**
  - Duration : 1986~1987
  - Total amount: USD 6 million approx.
  - Establishment of measurement standards to meet the needs of industries

Beginning Technical Services to Meet the Demands of Domestic Industries

- Commenced the national calibration and testing service from 1978
- Opened the Precision Measuring Instrument Repair Center in 1982
- Opened the standard time & frequency broadcasting station (HLA) in 1984 triggering the establishment of national standards in the field of temporal frequency

[Opening Ceremonies of Precision Measuring Instrument Repair Center and HLA]

Laying the Foundation of Cooperation with International Metrology Communities

- Providing the training workshop of 'National Standards System and Precision Measurement' from 1983 for developing countries
  - ☞ *Some 500 persons in total participated in the training course from 1983~2012*
- Became a member of the CIPM Consultative Committee of length (CCL), thermometry (CCT), and photometry and radiometry (CCPR)

[Visit of Thai Minister of S&T, Jul. 1981]

[Bilateral Comparison of Time Standards with US Navy, Jan. 1985]

[Visit of Dr. Kind, PTB President, Mar. 1988]

II. KRISS OVER THE LAST 40 YEARS

1) EARLY STAGE (1970s ~ 1980s)

2) GROWTH (1990s ~ 2000s)

- Expanding R&D infrastructures and capabilities
- Efforts to boost national and industrial competitiveness
- Strengthening cooperation with international metrology communities

1) TOWARD A LEADING NMI (2010s ~)

GROWTH OF KRISS (1990s ~ 2000s)

EXPANDING R&D INFRASTRUCTURES AND CAPABILITIES

- Renamed into the Korea Research Institute of Standards and Science (KRISS) in 1991 to cover wider scope of measurement S&T
- A non-magnetic measurement lab was build in 1993
- Completed the Advanced Materials Evaluation Center and an open area test site for electromagnetic waves in 1994
  - ☞ *As part of JICA project, financial assistance of about JPY 1,000 mil(some USD 9 mil) was made for advanced materials evaluation project from 1991~1996*
- Opened the Vacuum Technology Center and completed a building for structural integrity measurement in 2001
- A building for CRM was build in 2005

[Agreement with JICA]

[Non magnetic measurement lab]

[Open area test site]

Efforts to Boost National and Industrial Competitiveness

- Measurement technologies for **national strategic industries** such as IT, electrical/electronics, automobiles, steel, etc.
  - ☞ *Force and torque, cesium atomic clock/optical pumping atomic beam frequency standards, EMI/EMC, advanced materials properties, etc.*
- Measurement standards and technologies for **quality of life** such as environment and food, public health, safety, etc.
  - ☞ *Safety measurement technologies for large structure, failure prevention, magneto-cardiography & encephalography, CRMs for greenhouse gas measurement/air pollution, clinical diagnosis and biomolecule, etc.*
- Initiation and strengthening of **technology transfer programs** to industries
  - ☞ *Training of precision measurement technologies, measurement club(2004), home doctor program(2008), etc.*

Strengthening Cooperation with International Metrology Communities

- Became a member of CCs of time & frequency (TF), electricity & magnetism (EM), mass & related quantities (M) in 1992; a founder member of amount of substance(QM) in 1994; a member of ionizing radiation (RI) in 1997; and, a member of acoustics, ultrasound and vibration (AUV) in 1999
- Signed the CIPM MRA in 1999 and participated in KC in many measurement areas
- Performed various joint researches with developed NMIs (NIST, PTB, NMIJ, INMS, IMGC, VNIIM, CENAM, etc) and providing individual training courses and calibration services to developing NMIs (VMI, MASM, ITDI NMS, CSIRO, etc)
- Hosting int'l conferences (i.e. the APMP 2005, IMEKO TC Conferences. etc.)

[Signing the CIPM MRA]

[APMP 2005]

[Rebuilt main gates in 2005]

II. KRISS OVER THE LAST 40 YEARS

1) EARLY STAGE (1970s ~ 1980s)

2) GROWTH (1990s ~ 2000s)

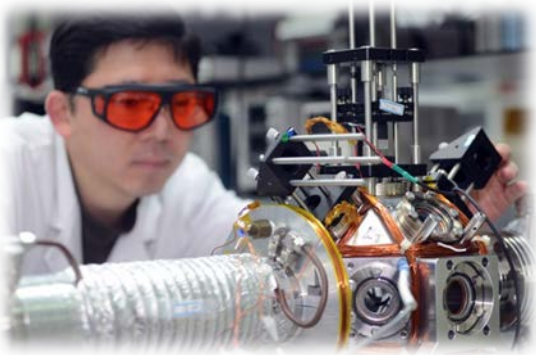
3) TOWARD A LEADING NMI (2010S ~)

- R&D for next paradigm
- Service provider for the innovation of national quality infrastructure
- Responsibility as a global partner

TOWARD A LEADING NMI (2010S ~)

R&D FOR NEXT PARADIGM

- R&D for new quantum-based SI units
  - ☞ *Watt balance, optical lattice clock with the Ytterbium(Yb) atom, quantum current standards, next generation measurement standards of electromagnetic wave, etc.*
- R&D for strengthening measurement capability for quality of life
  - ☞ *Environmental protection(greenhouse gas, air pollution, etc.), healthcare(clinical diagnosis and biomolecule), food safety(nutrient, contaminated ingredient, etc.), safety assessment of infrastructures, etc.*
- R&D for leading future society through measurement at the frontier
  - ☞ *Brain and cognition measurement, nano-materials, nano-bio safety, renewable energy(reliability and performance of solar cell, etc.), space optics, high vacuum, advanced instrumentation, etc.*



SERVICE PROVIDER FOR THE NATIONAL QUALITY INNOVATION THROUGH MEASUREMENT S&T

- Contributing to the improvement of national quality infrastructure by providing high-quality of testing/calibration services and a variety of technology service programs

Consulting on technical difficulties

Consulting on technical difficulties on industrial sites

Hidden Champion Program

Fostering promising SMEs as the world's top hidden champions

Home Doctor Program

Offering one-on-one customized technical support for SMEs by KRISS specialists

Technical Consulting

Technical support to address technical difficulties requested by customers

Joint usage of research instrument

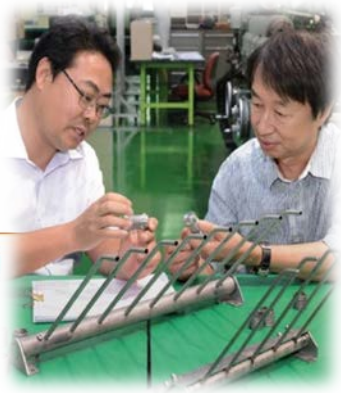
A program to disclose and utilize high-end measurement instrument

Start Up Venture Companies Support Program

A program for machinery support for would-be entrepreneurs

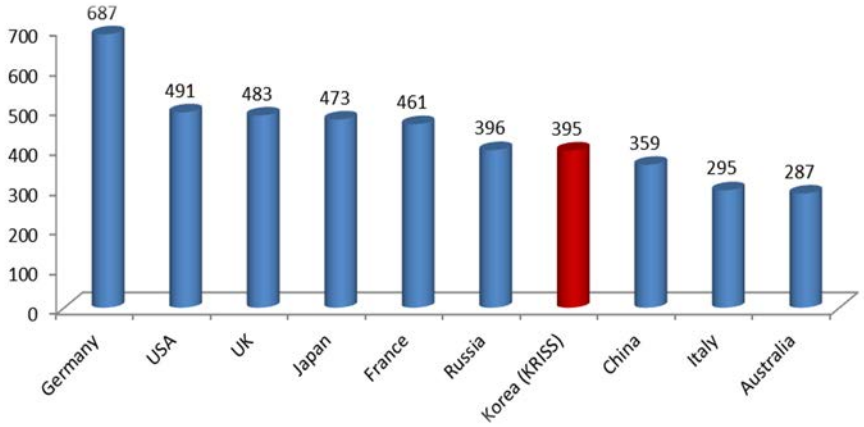
Measurement Club

KRISS' iconic information exchange network on measurement

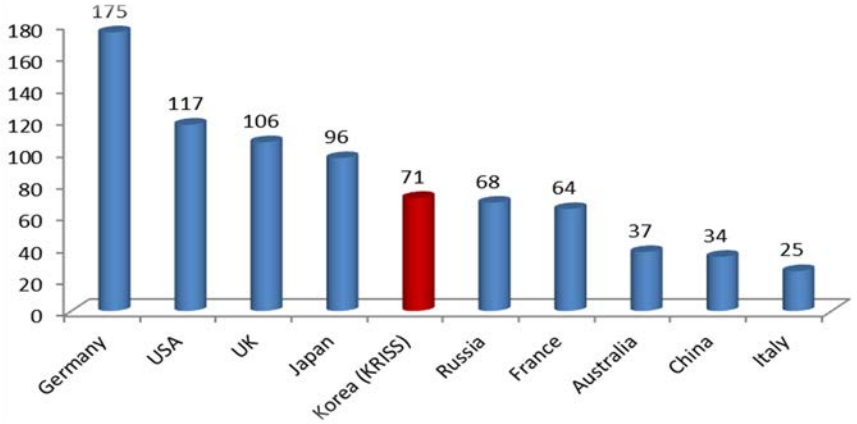


RESPONSIBILITY AS A GLOBAL PARTNER

- Participation in the international metrology organizations (APMP, CIPM, etc.) and CIPM MRA related activities
- Strengthening collaboration with developing NMIs, including GMA, KRISS-UST graduate school of metrology, etc.



[No. of KC participation, as of Dec 2015]



[No. of KC pilot, as of Dec 2015]

SUMMARY

How was it possible for KRISS to grow as one of the successful NMIs?

Assistances from International Organizations and Developed Countries/NMIs

- IBRD, ADB, OECF, JICA, US Aid, etc.
- USA(NIST), Japan(NMIJ), Germany(PTB), etc.

Government's Strong Will and S&T Initiative

- Government's contribution to KRISS in 2015 (USD 79 million approx.) is 585 times bigger than that in 1975 (USD 135,000 approx.)
  - ☞ *Total budget of in FY2015 is some USD 123 millions, including other revenues.*
  - ☞ *GNI per capita increased 44 times for the same period.*
- The number of employee rose to 446 in 2015 from 48 in 1975
  - *As of Jan 2016, total number of employee is 720.*

SUMMARY

More Importantly,

- **Enthusiasm for What you do and Confidence about the Future**
  - Nothing but money and outer sympathy are not enough.
  - Without enthusiasm about what you are doing and confidence about the future, it would not be possible to persuade your stakeholders.

THANK YOU!