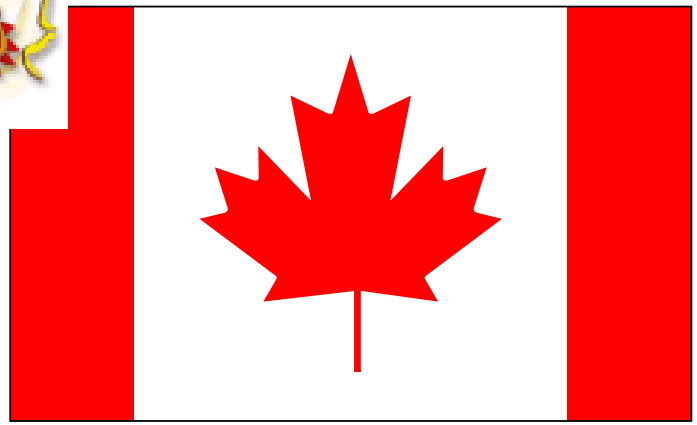
Presentation to the Canada/China Friendship Society

Dr. Wang Qiming
Science Counsellor
Embassy of the People's Republic of China



Margaret McCuaig-Johnston
Senior Fellow
Institute for Science, Society & Policy
University of Ottawa

Ottawa, September 17, 2013

Searching for a New Source of Growth:
China's Innovation Driven Development Strategy

WANG Qiming
Science Counsellor

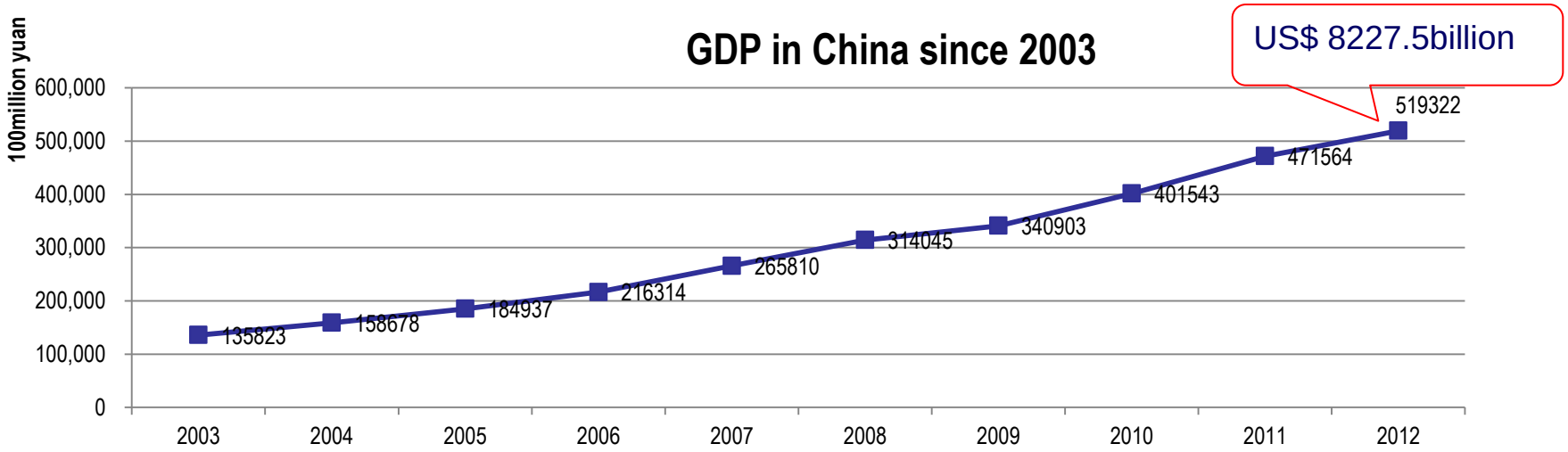
Overview of Presentation

1. Status report on Chinese economy: the starting point for the future.
2. China's current economic development model and its limits
3. China's S&T and innovation capacity
4. Strengthening China's S&T performance and its innovation based economy
5. Future Canada & China opportunities in S&T and innovation

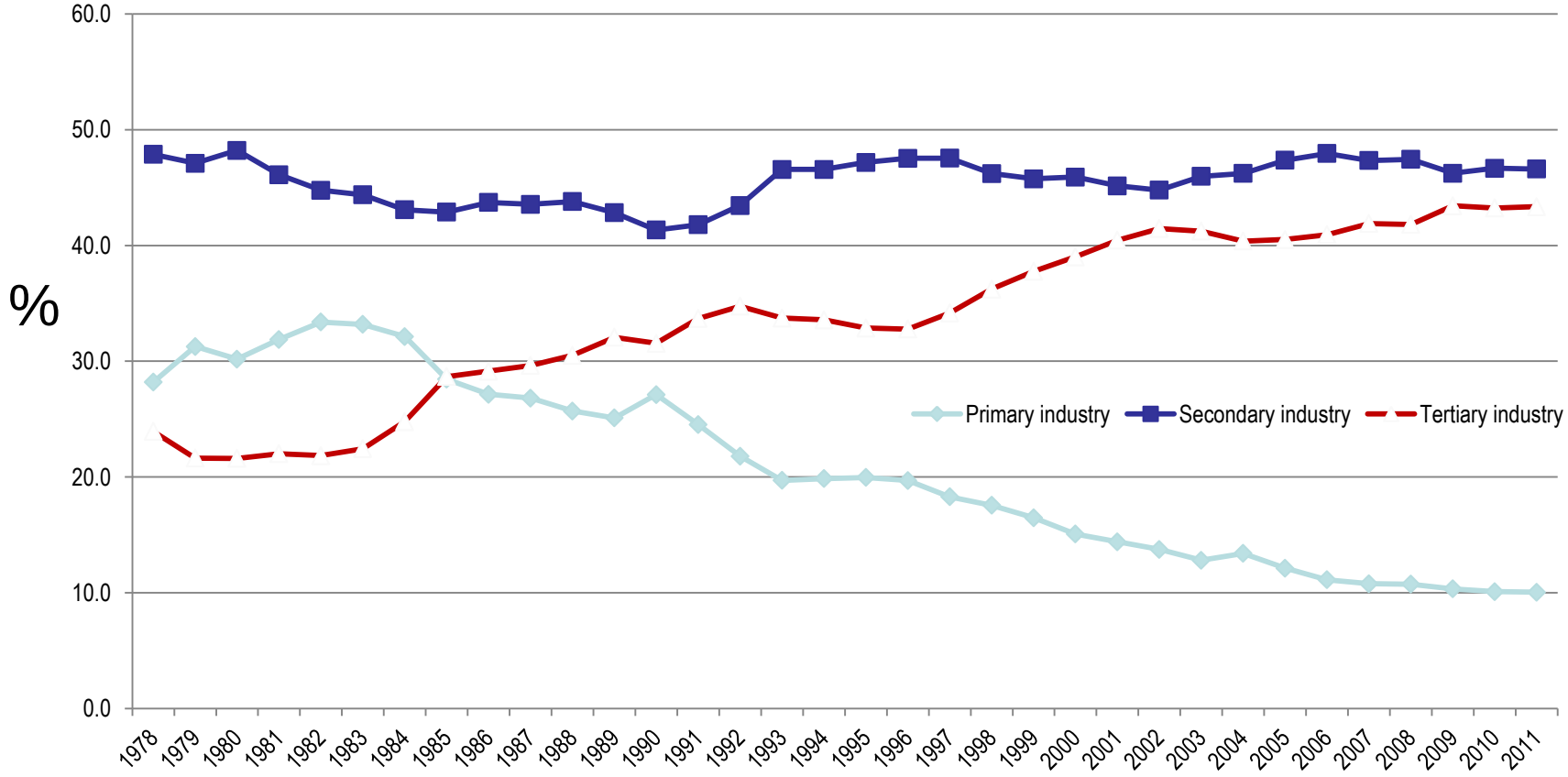
Chinese Economy Growth and its Status in the World

- Gross Domestic Products (GDP in 2012):
  - ¥ 52 trillion Yuan (RMB)
  - US$ 8,227.5 billion (6.312:1)
- 2nd largest economy, the largest trade country (exporter), the largest manufacturing country in the world

The Rapid Growth of Chinese Economy



China's Sector Dynamics: 1978-2011



Industrial Structure is Unlike to the Developed Economies

- Industry Structure in China (2012)
  - Primary (Agriculture): 10.0%
  - Secondary (Industry): 45.4%
  - Tertiary (Services): 44.6%

- Industry Structure in USA (2011)
  - Primary (Agriculture): 1.2%
  - Secondary (Industry): 19.2%
  - Tertiary (Services): 79.6%

Imbalance Regional Development: Prosperity and Poverty Coexisting

- GDP per capita (2012):
  - ¥ 38,354 RMB, US$ 6,076
- Beijing, Shanghai, Tianjin, Jiangsu, Zhejiang (provincial level) > $10,000 per capita in 2012
- 31 cities > $10,000 per capita
- However, many rural areas Yunnan, Gansu, Tibet, and Guizhou still below $4,000

China's Current Economic Development Model

- low cost in production
- high investment
- export orientation

High growth & wealth creation

High natural resources consumption,

Low wages, and environmental pollution

But the Old Economic Drivers Are Weakening

- Increasing cost of investment
- Increasing complex international trade environment
- Disappearing “demographic dividend”

China needs new sources of growth

A New Strategy Is Emerging

- Changing from “Workshop of the World” to an innovative economy is fundamental
- Since 2000, R&D has been a national priority
- China has a growing S&T knowledge base and solid institutional foundation
- Now China must expand its S&T and implement a more effective innovation strategy
- Going forward S&T and innovation will be driving forces for sustainable prosperity and development

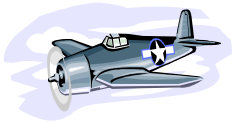
Evolution of S&T Strategies & Policies: Continuous Focus on Integration of S&T and Economy

- 1980: Lean-upon and Face to:

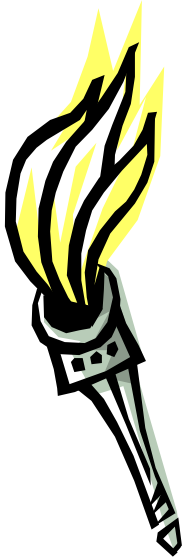
  Economic development must lean upon advancement of S&T, S&T development must face to economic development
- 1986: Assimilation & Commercialization of High-Technologies
- 1995: Rejuvenating China through Advancing Science and Education
- 1996: Sustainable Development
- 2003: Talent Strategy
- 2006: Home-grown Innovation
- 2012: Strengthening the National Innovation System

NATIONAL ROLES : POLICY AND CATALYTIC PROGRAMS

Whole system still on process of coordination



High Technology



BASIC R&D

Tech Leaping

- Mega programs
- 973 programs
- 863 programs
- Supporting programs
- Policy leading programs
- International Cooperation programs
- Innovation Talent programs
- Innovation Bases programs

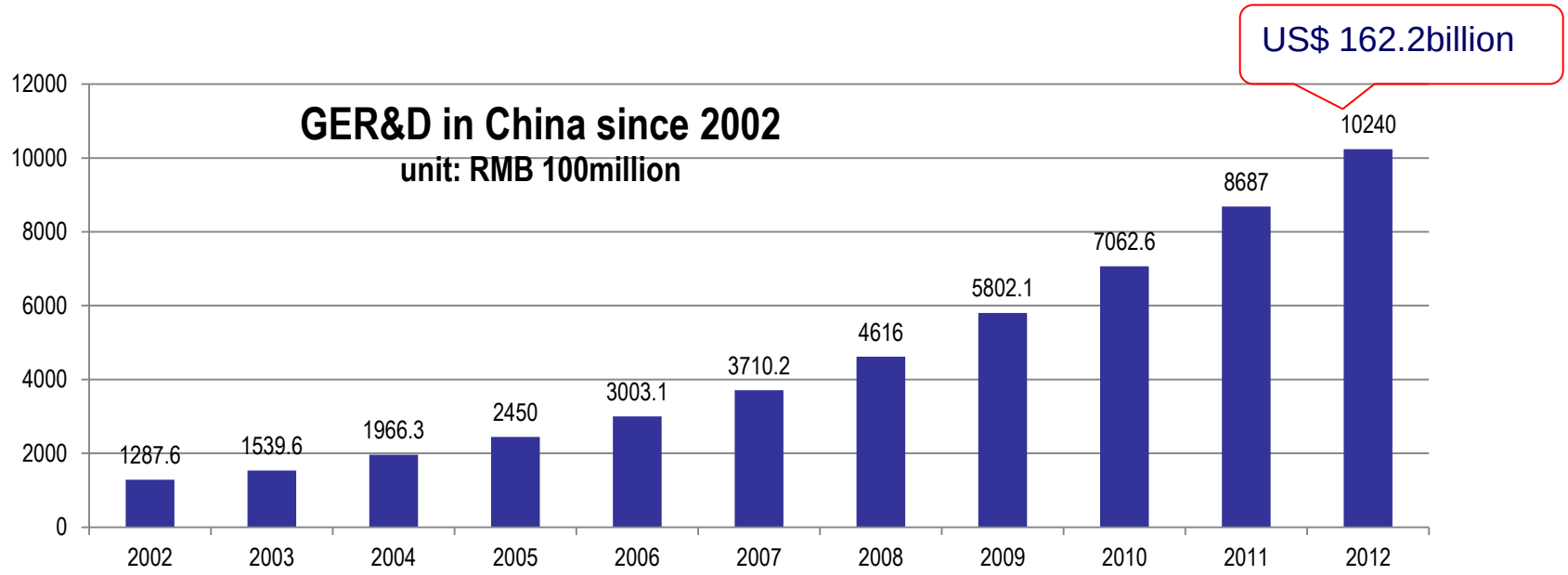
1982	1986	1988				
Key Technology R&D Program	SPARK PROGRAM	863 PROGRAM	TORCH PROGHRAM	973 PROGRAM	S&T Supporting PROGRAM	MEGA PROGRAM
1982	1986	1988	1997	2006	2007	

National S&T Mega Programs in China since 2007

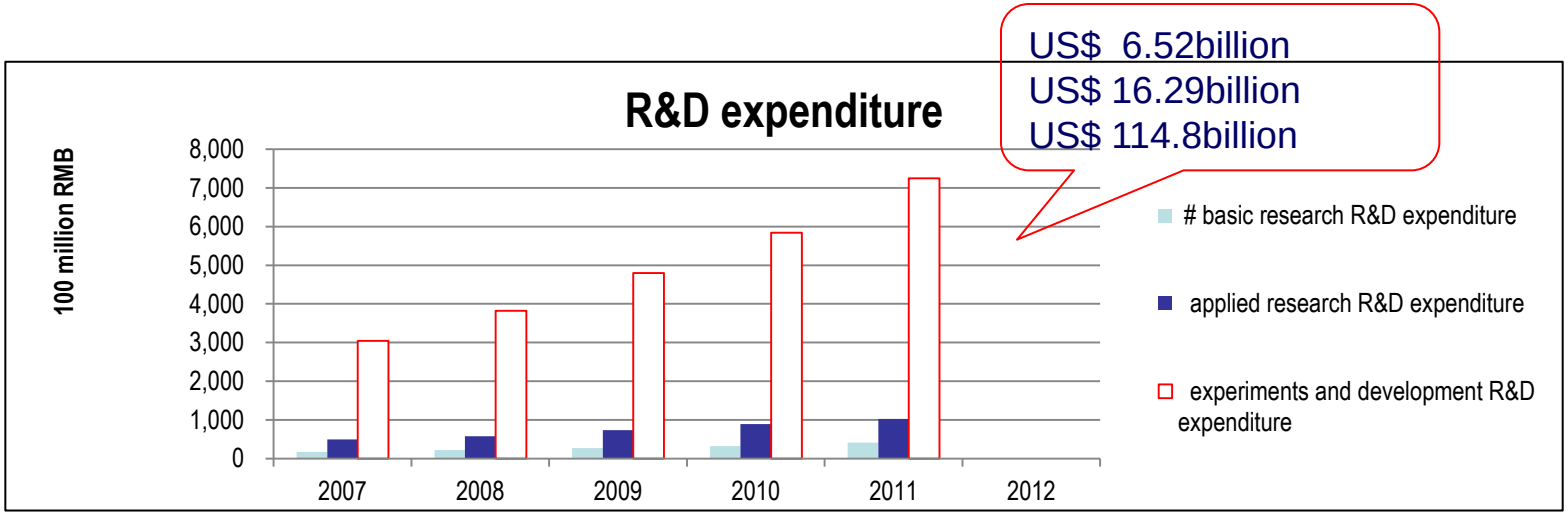
- In order to achieve the national targets, to complete the significant strategic products, key generic technologies, and major projects through core technology breakthroughs and resources integration.
- Cases of Mega Programs: Core electronic devices and software, Integrated circuits equipments, Mobile broadband communications, Numerical control machine tools, Major oil and gas development, Water pollution control, Large-scale nuclear power plant, Transgenic, New drugs creation, Infectious disease control and prevention, Modernization of TCM, Large aircraft, High-resolution earth observation system, Manned space flight and lunar exploration project etc.

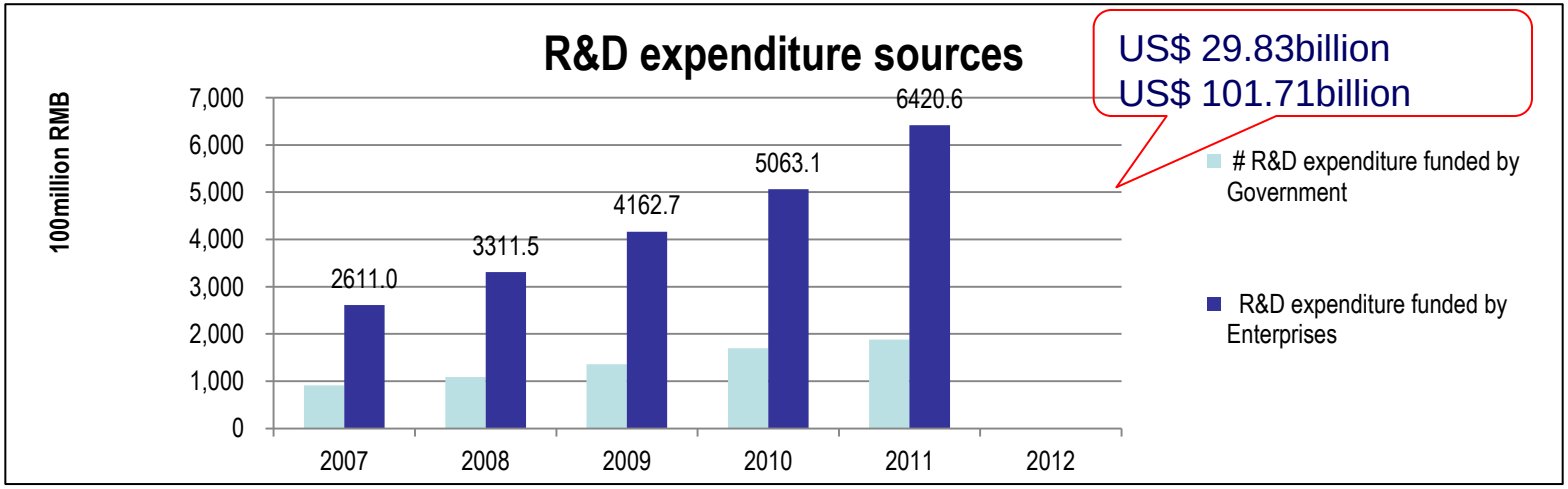
China's S&T & Innovation Capacity Has Global Status

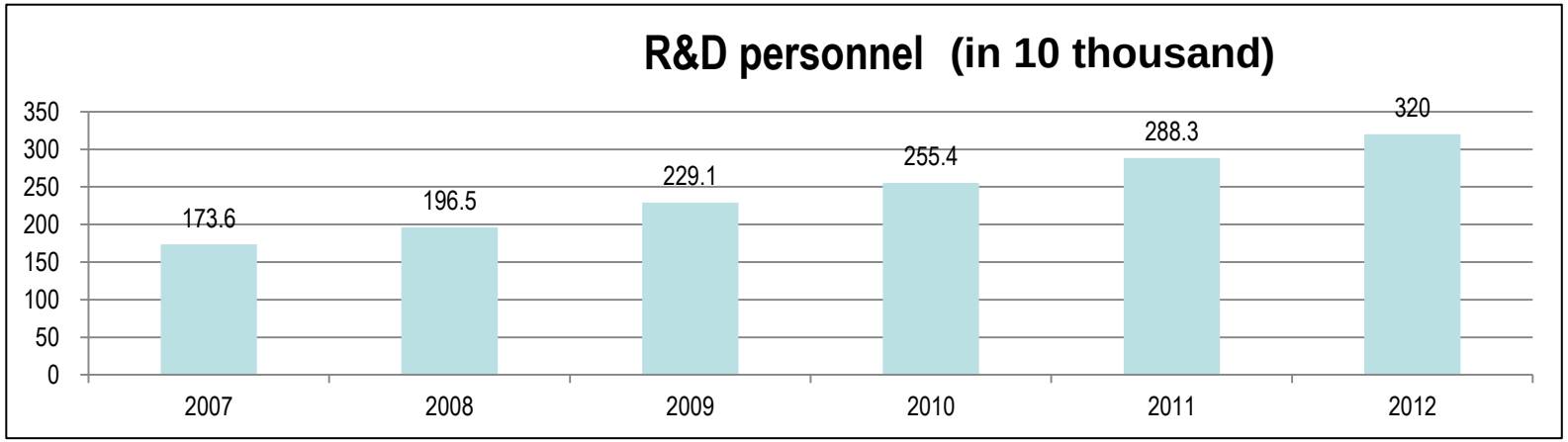
- The gap is narrowing between China and world's advanced countries in terms of science and technology development (Science report 2010, UNESCO).
- China has a national S&T and innovation system with several fields ranking among world leaders.
- R&D total input ranks Top 3 in the world (after USA, Japan).
- R&D/GDP ratio (1.97%, 2012) equals to average level of the developed economies.
- Number of int'l scientific papers (SCI) No.2 in the world for 5 years, however 2012 citation rate ranks only No.6
- Number of invention patents granted ranks No.3 in the world.

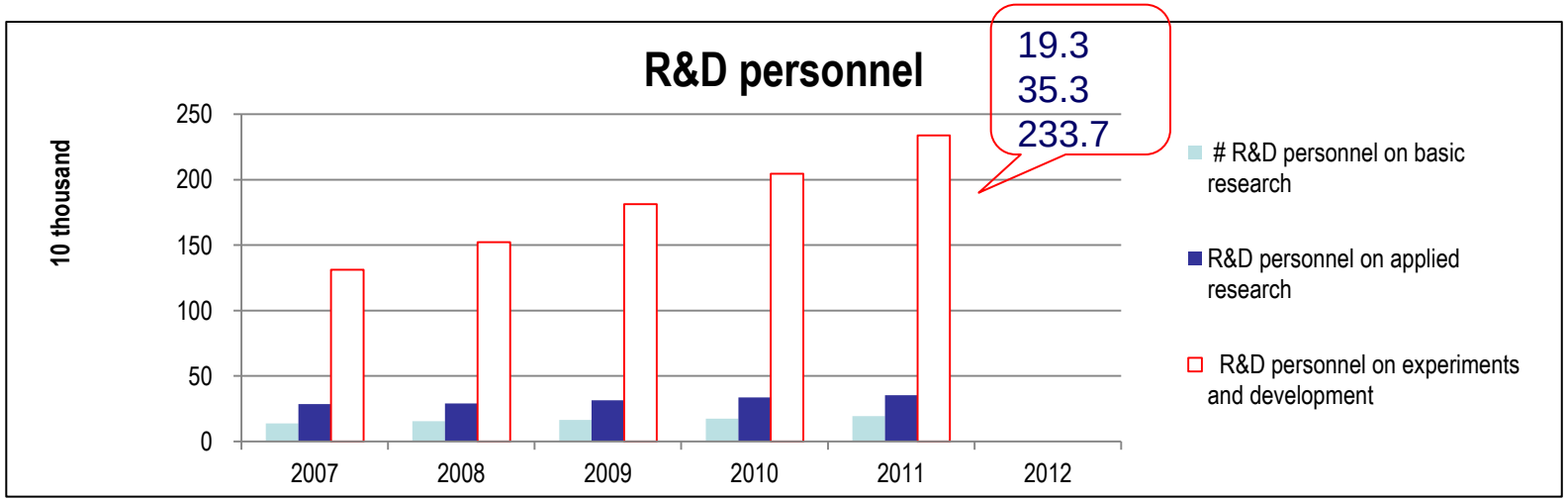

US$ 162.2billion
GER&D in China since 2002
unit: RMB 100million
12000
10000
8000
6000
4000
2000
0
1287.6
1539.6
1966.3
2450
3003.1
3710.2
4616
5802.1
7062.6
8687
10240
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

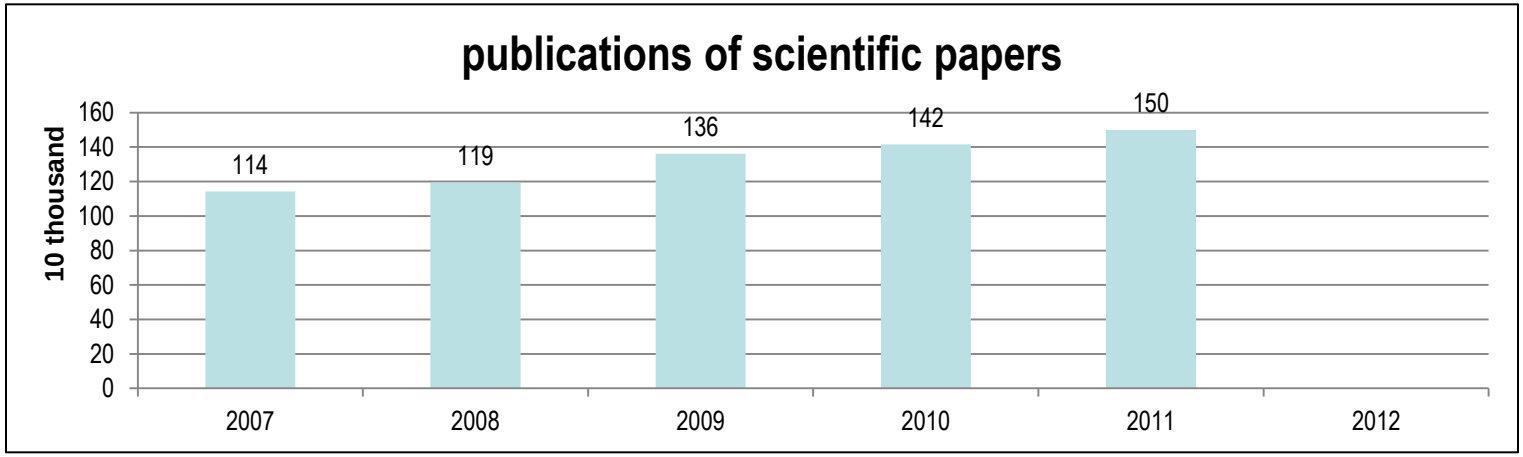

GER&D/GDP in China from 2002-2012
GER&D/GDP
1.97%
3.00%
2.00%
1.00%
0.00%
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

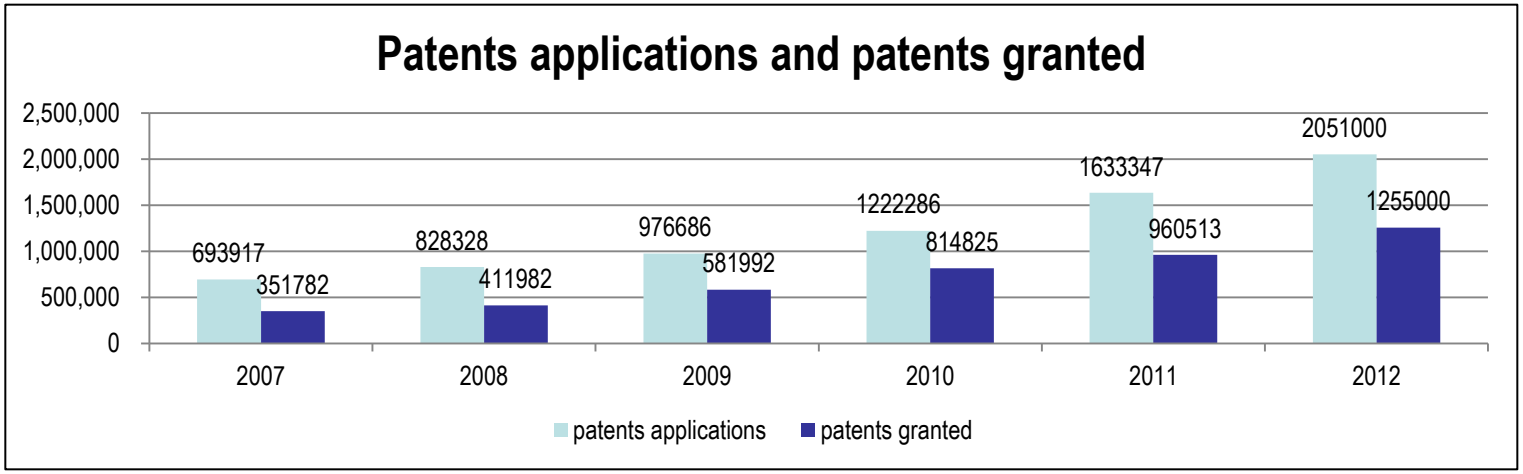

R&D expenditure
US$ 6.52billion
US$ 16.29billion
US$ 114.8billion
100 million RMB
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2007
2008
2009
2010
2011
2012
basic research R&D expenditure
applied research R&D expenditure
experiments and development R&D expenditure

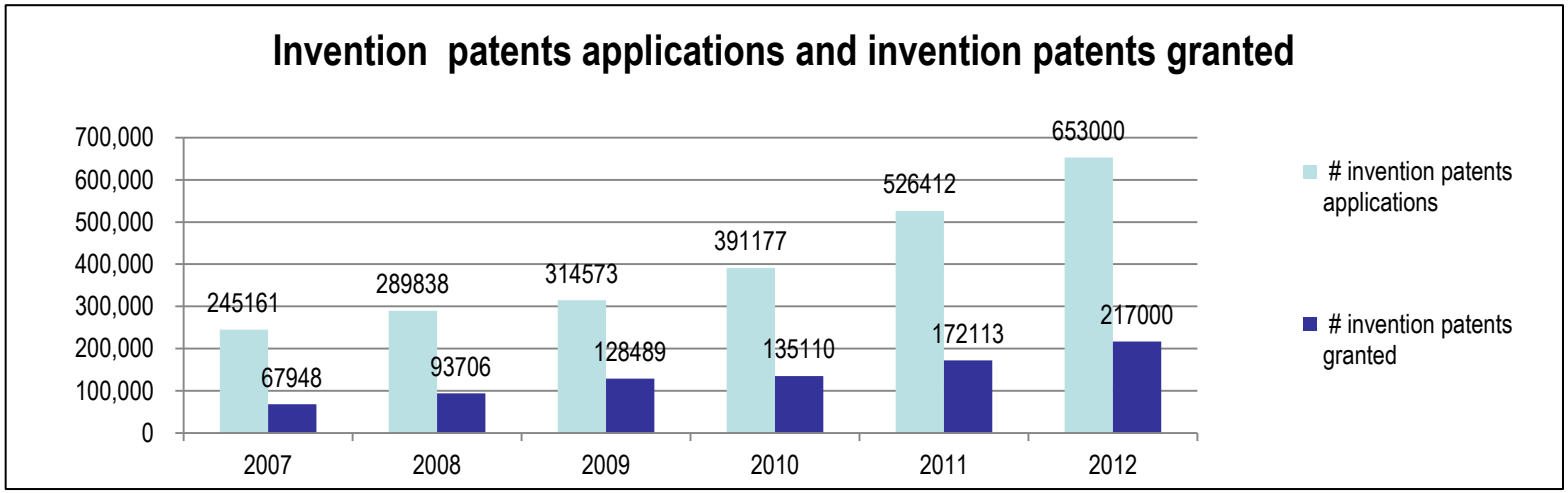

R&D expenditure sources
US$ 29.83billion
US$ 101.71billion
100million RMB
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2611.0
3311.5
4162.7
5063.1
6420.6
2007
2008
2009
2010
2011
2012
R&D expenditure funded by Government
R&D expenditure funded by Enterprises

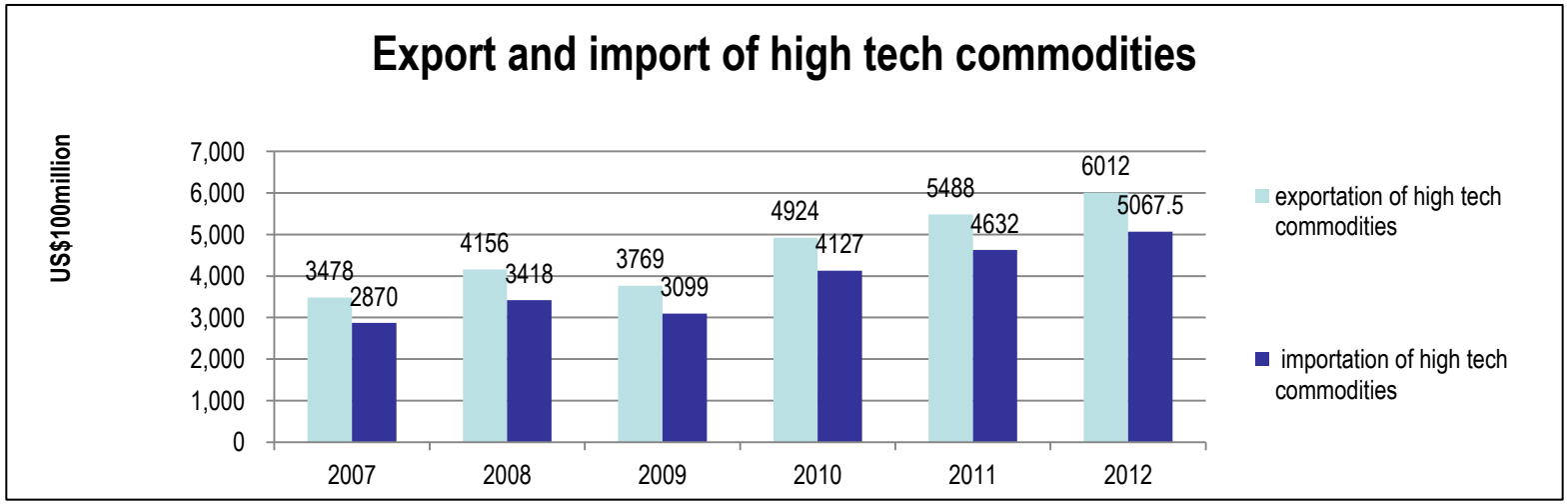

R&D personnel (in 10 thousand)
350
300
250
200
150
100
50
0
173.6
196.5
229.1
255.4
288.3
320
2007
2008
2009
2010
2011
2012


R&D personnel
10 thousand
250
200
150
100
50
0
2007
2008
2009
2010
2011
2012
19.3
35.3
233.7
R&D personnel on basic research
R&D personnel on applied research
R&D personnel on experiments and development

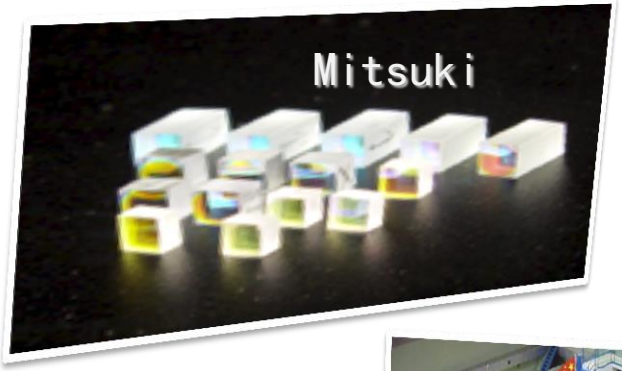

publications of scientific papers
10 thousand
160
140
120
100
80
60
40
20
0
114
119
136
142
150
2007
2008
2009
2010
2011
2012

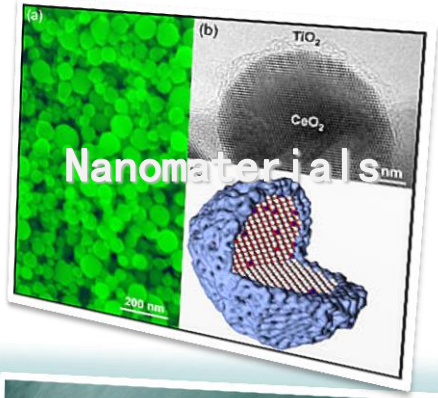

Patents applications and patents granted
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
693917
351782
828328
411982
976686
581992
1222286
814825
1633347
960513
2051000
1255000
2007
2008
2009
2010
2011
2012
patents applications
patents granted

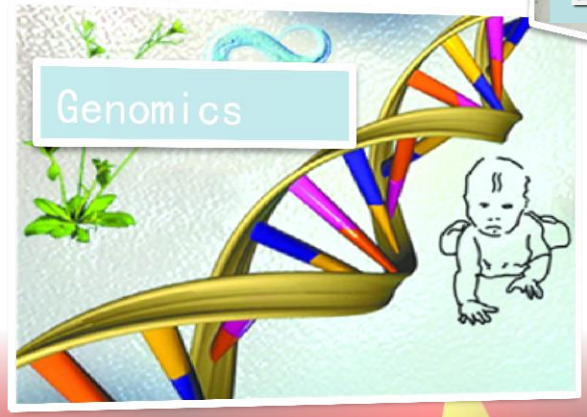

Invention patents applications and invention patents granted
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
245161
67948
289838
93706
314573
128489
391177
135110
526412
172113
653000
217000
2007
2008
2009
2010
2011
2012
invention patents applications
invention patents granted

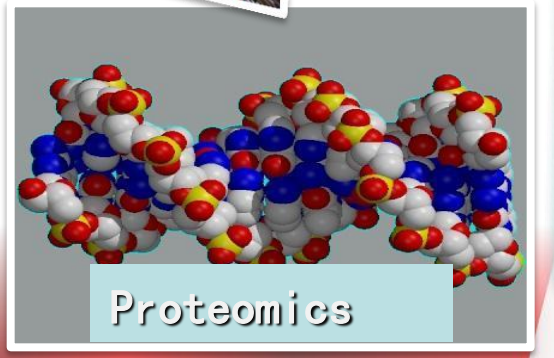

Export and import of high tech commodities
US$100million
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
3478
2870
4156
3418
3769
3099
4924
4127
5488
4632
6012
5067.5
2007
2008
2009
2010
2011
2012
exportation of high tech commodities
importation of high tech commodities

Outstanding Basic Research Achievements



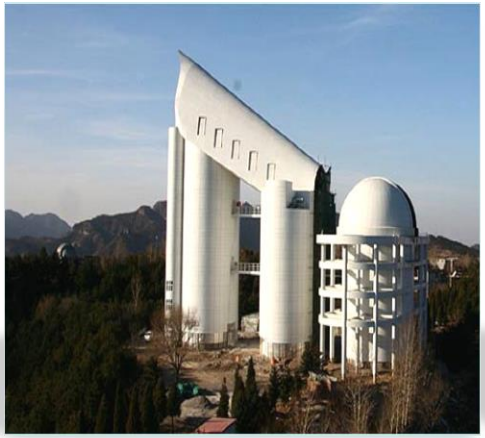






Significant S&T Projects

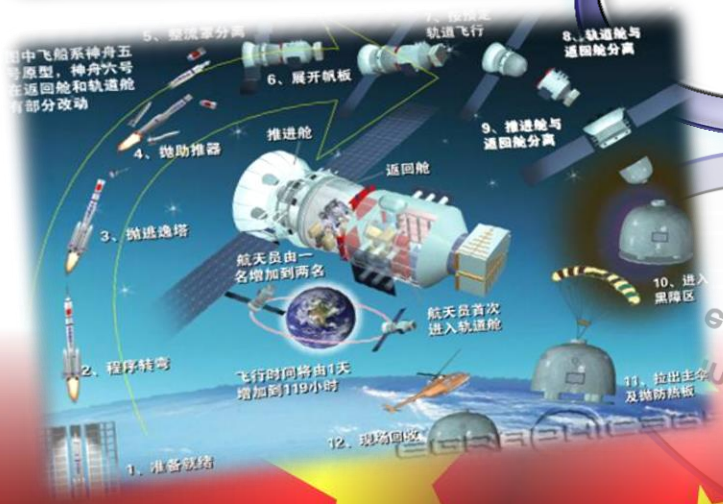
LAMOST

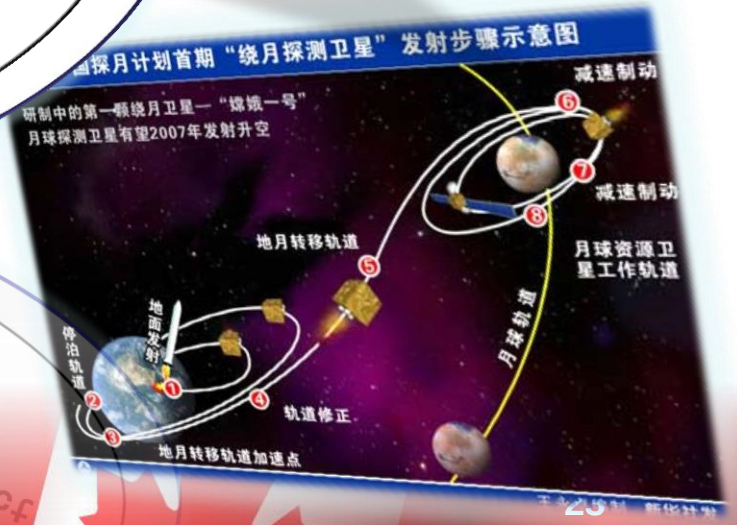


Polar expedition

Significant S&T Projects

Manned space and lunar exploration project





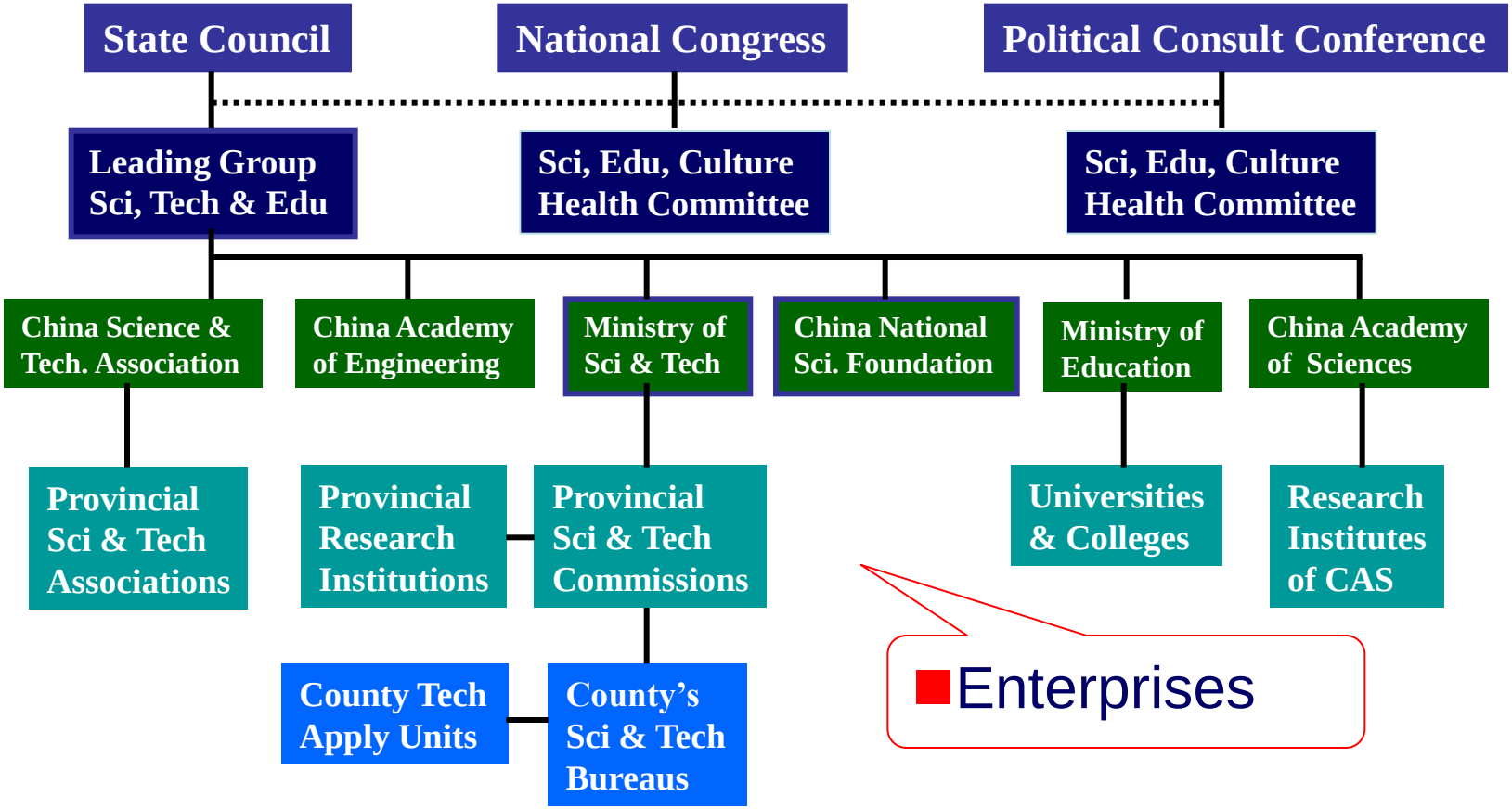
Key Technology Development and Applications on Livelihood

Infrastructure on high-speed railway, urban metro, cargo ports, electric bus etc.

Technologies Environmentally Friendly

Reduction and energy saving (2008 Olympic Games and 2010 World EXPO)

China's National S&T Governance Structure



But Critical Challenges Remain in China's S&T & Innovation

- Low capacity for home-grown innovation, lack of innovation resources
- Too heavy an emphasis on "rapid follower" policies
- Weak in key technology development and systematic synergy
- Lack of leading talents

- Quality instead of quantity: productivity, efficiency and high value-added
- Mobilizing S&T and innovation resources more effectively on a whole society effort
- Maintaining a high quality of professionals at national level
- Creating a supportive environment for scientific research and innovation

New Innovation Strategy Requires Changes on Current S&T Policy

- From investment-driven economy to innovation-driven development
- From a “Rapid Follower” S&T policy to a “Innovative” S&T policy
- From export-oriented to demand-oriented S&T strengths
- Emphasis on improving the lives and livelihood of Chinese population
- Going global cooperatively

National R&D Strategy for 12th Five-Year Plan (2011-2015)

- Concept of scientific development
- Long-term national plans for science, education and talents (up to 2020)
- Build up an innovative country
- Mitigation and energy saving in coping with climate change
- Adjustment of industry structure and transform of development model

Guidelines for China S&T in Next 15 Years (2006-2020)

- Home-grown innovation
- Leaping-frog in key areas
- Underpinning development
- Taking lead to the future

Home-Grown Innovation

- Power in guiding technology development
- Enterprises as key player in linking universities and marketplace
- Research not just ends up with papers but with products in market
- Special policy package with 60 articles in favor of innovation released in 2007
- Technology transfer, absorbing and assimilation

Invest in Innovation Chain to Meet Industry Needs & Opportunities

- Focus on industrial demands
- Speed up technology transfer & industrialization
- Strengthen enterprises as key player in technology innovation system, promoting **all** innovation elements and resources concentrating on firms
- Create an innovation ecosystem in alliance with industries and academies, up and downward firms on production chains, large and SMEs collaborations

New Global Perspective

- Bring a global view to planning and implementing China innovation strategy
- International S&T cooperation is pivotal to the new innovation strategy

China – Canada S&T and Innovation Opportunities

- China and Canada are both making strategic policy adjustments
- Reorienting S&T and innovation to benefit economic growth
- Both countries S&T feature highly complementary
- Effective cooperation can generate benefits for both countries, especially for technology transfer

China-Canada S&T Joint Committee

- Co-Chairs: MOST deputy minister CAO Jianlin and CIHR president A. Beaudet
- 7 working groups in 8 areas: clean energy, environment, bio-pharma, agriculture, ICT, nano-tech, aero-tech, and transport

Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada

China-Canada Science and Innovation in Agriculture
中国-加拿大在农业领域的科学与创新合作

Canada

China-Canada Science & Innovation Centers

The China-Canada S&I Centre on Oats in Baicheng

3) Research and demonstration

As of 1999, about thirty kinds of Canadian oats are mixed with local ones. The experience was successful: 1 mu (1/15 hectar) experimental in 1999 to 4500 mu in 2003. 8 Canadian varieties were kept (Drs Zhou and Burrows).

Key Personnel on China Canada Oats Collaboration

In 2007, Canadian Agriculture and Food Minister Mr. Gerry Ritz (left) awarded Dr. Vernon Burrows (middle) Memorial Prize for Public Sector Achievements.

China oat breeder Dr. Ren Changzhong (right) with Dr. Vernon Burrows (left) at National Oat Breeding Base in Baicheng, Jilin province in China.

Canada/China S&T Relations

Margaret McCuaig-Johnston
Senior Fellow
Institute for Science, Society & Policy
University of Ottawa

Canada's Federal S&T Strategy

Vision: **building a sustainable, national, competitive advantage through Science &Technology**

Entrepreneurial Advantage
Translate knowledge into practical applications to improve our wealth, wellness and well-being

Knowledge Advantage
Build on research and engineering strengths, generate new ideas and innovations, and achieve excellence.

People Advantage
Grow the base of knowledge workers by developing, attracting and retaining highly-skilled people.

Priorities: **1. Environmental S&T**
2. Natural resources & energy
3. Health & related life S&T
4. Information & Communications

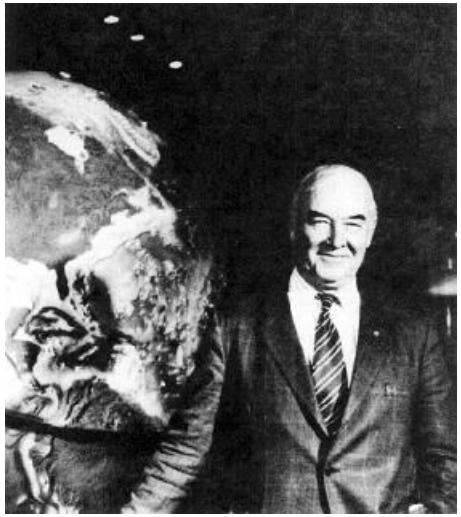
There have been important science and technology relationships through the years

Academics, such as….

Prof. Tuzo Wilson

Geophysics, UofT

toured China during GLF



Dr. Song Weihong

Medicine, UBC

Research Centre in Chongqing

Children’s Hospital under his direction

Dr. David Strangway

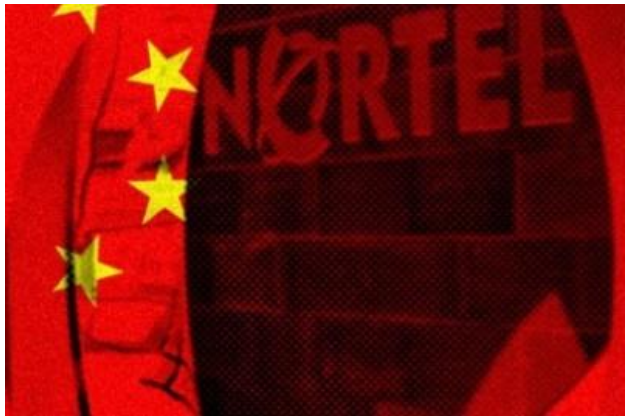
Past President, CFI; Quest University

Co-chaired China’s Task Force on Innovation & Environment

Companies, such as….

Nortel

Leap Frogging Technologies



Ballard Fuel Cell Buses

GE Hydro technology: the turbine runner for the Three Gorges dam, China, manufactured by the GE Hydro/Voith Siemens consortium.

Turbines in Three Gorges Dam

General Electric Canada

China-Canada S&T Agreement (2007)

Provides a framework under which Chinese and Canadian partners from industry, academia and government can collaborate on joint research and development projects, conferences and workshops, equipment exchanges, and student and research mobility

Sectors of Focus:

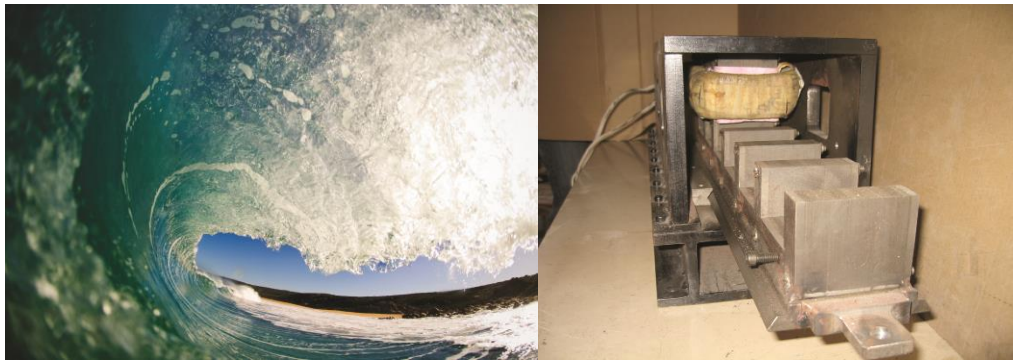
- Life Sciences
- Energy and Environment
- Agriculture and Agrifood
- Information and Commun Technologies
- Civil Aviation (added in 2010)

Excellent projects are already having impact ….

2007-2012: 17 projects, 27 partnership activities,$20M

RoboNurse, Improving Patient Care

Environmentally Friendly Pulp in a Billion Dollar Global Market



Harnessing Ocean Waves For Power

Helping Dairy Farmers Breed Genetically Superior Cattle

More focus was introduced for the most recent competition…..

Beijing, February 8, 2012
“ Prime Minister Stephen Harper and Chinese Premier Wen Jiabao today witnessed the signing of ... a statement of intent to launch **two new calls for proposals** for joint research and development projects under the Canada-China Framework Agreement for Cooperation on Science, Technology and Innovation”

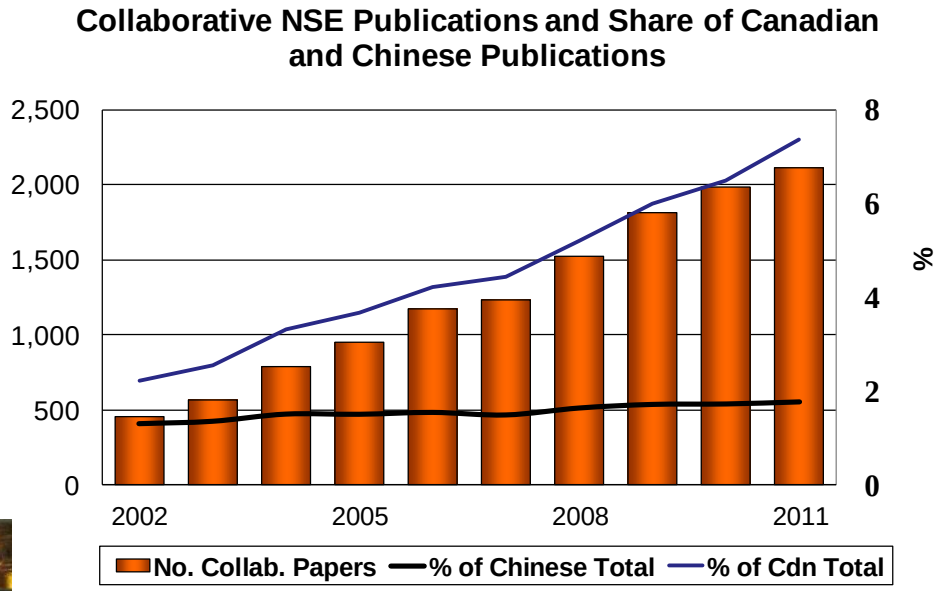
Areas of focus:

- Human Vaccine Research

- Clean Automotive Technologies

Academic exchanges have been increasing over the years …..

The number of joint academic publications has more than quadrupled in ten years……



Canada/China Academic Fora are bringing more coherence to our engagement……

So what more can we do …….?

- Commit to the relationship with **frequent, sustained relations** that are backed up by **substantive funding**….
- Deepen our partnerships in **key industry sectors**….
- Invest in **academic exchanges** that will build research relationships and networks for the future…
- Develop **joint labs and innovation centres** in both countries….