Medical Technology & Device Financing & Health Systems Strengthening in the 21st Century

A Summary: Options for thought

by

Ok Pannenborg
World Bank Group and global finance perspective on medical technology & medical device (MT/MD) developments

- WBG & RDBs funding for global health 2009: > US$ 5 billion (out of a total of +/- US$ 25-30 billion for all international financing for global health)

- Medical technology & medical devices funding included in this, but largely invisible – operationally, policy-wise and strategically
Medical devices and technology

- Medical consumables (syringes, wound dressings, gloves)
- Rapid diagnostic tests (pregnancy, HIV, malaria)
- Lab equipment (glass ware, microscopes, HPLC)
- Implantable devices with/without drugs
- Patient-based portable devices (glucometer, CPAP)
- Facility-based devices (incubators, ultrasound, x-ray)
- Surgical instruments
- “Investment-type” devices (MRI, radiotherapy)
- Devices, equipment, consumables
Health Networking and Information Technology

- Telemedicine, stationary or mobile; (diagnostic, therapeutic)
- Electronic patient records, stationary and mobile (smart cards)
- Telemedicine, stationary or mobile; (diagnostic, therapeutic)
- Mobile technology for management systems
- Mobile technology for education and compliance management
- Health kiosks (diagnostic and treatment algorithms)
- Remote expert “call” centers
- GPS mapping and tracking and monitoring tools

M-Health, E-Health
World Bank perspective on MT/MD and health systems strengthening

- Pharma comparison (see next slide)
- Highly fragmented
- Not just separation, but dichotomy of
  - synthesis of evidence (incl. safety)
  - regulation
  - financing
  - RDI and investments
- OECD / G-20 / LMIC distribution
Pharmaceutical Innovation & Technology – comparison

In comparison, MT and MD so far remain at lower and middle levels in:

• politics
• management
• national & global prioritization (health, industry, RDI, trade)

+ culture of “regulation & control” (see WHA Resolution 60.29)

Public & private global MT/MD reality changing
(this First Global MT/MD Forum an important international expression of this trend)
Why would MT/MD be of interest to global health funders?

- MT/MD field **expanding** – **health effects**
- LMIC economies and MT/MD potential **expanding**
- **Disconnect** of MT/MD’s proportional role in health sector reform dynamics/negotiations (incl. IMF)/funding decisions
- Diminishing role & productivity of pharma and biotech
- **Scenarios MT/MD:** - incremental - **universal access**
  - fundamental
  (probability of paradigm shift)
**Typical 2010 International LMIC Health Sector Reform & Strengthening Policy Dialogue**

- Main decision makers / counterparts:
  Government (Ministry of Finance, of Economics, of Trade/Commerce, of Industry and Ministry of Health)

- Main Financing areas:
  > diseases programs (ATM, NTDs, + chronics)
  > work force (HRH)
  > financing & insurance reform
  > management / decentralization / etc.
  > pharma
  > infrastructure

- Little or no MT/MD development/ policy/ strategy/ investment
World Bank/IFC/RDB’s LMIC HSS Preferences for MT/MD

- WHA Resolution 60.29: ++++++
- Make MT/MD central in health sector reform policy dialogues, nationally and internationally
- Strengthen/create powerful MT/MD Departments in MoHs, juncto MT/MD focal points in Ministries of Finance, Research & Industry
- Create/ strengthen LMIC regulatory agencies, with clinical and academic/analytical back-up
- Put MT/MD policy central in insurance/financing, decentralisation, infrastructure and workforce/training
- Push innovation & investment policies for MT/MD in selected G-20 LMICs
For consideration: Global MT/MD Partnerships

- Current: most global health partnerships are disease or pharma dominated: GFATM, GAVI, RBM, TB++, AIDS++, NTDs+, etc.
- also RDIs: TDR, MMV, IAVI, HRP, etc. (exc: FIND)

- to consider: Global MT/MD Partnerships/Funds for: synthesis of evidence
  - regulation
  - investment
  - RDI
  - financing
Incremental or paradigm shift?

- 21st century economies & development: technology-based and -driven

- 21st century medical & health care: increasingly similar
  - OECD countries
  - rapid LMIC growth
  - major LMIC public health and PHC changes because of IT/MT/MD combinations
  - LMIC demand explosion (private sector)
Incremental Global MT/MD: good, but ....

• Mentioned approach will likely deliver the goods, but will take long time, > 20+ years (slow universal access) (cf. global pharma rise 1970 – 2010)

• Meanwhile MT/MD may increasingly assimilate with global pharma in terms of both fundamentals (e.g. exclusive R&D and patents versus R&D and sales cross-licensing) and in terms of products (less distinction, more combined MT/pharma innovations and products)

• but: hard to prioritize global MT/MD priorities for the needs of poorer populations and countries
Recognize that

**health systems worldwide will increasingly become health technology systems**

(DNA, screening, prevention, diagnostics, treatment, rehabilitation, feedback loops: one consistent MT sequence)
Increasing Prevalence and Burden of Chronic Diseases

- Main cause of death for 50% of people worldwide
- By 2020, chronic diseases will account for almost three fourths -75%- of all deaths worldwide ..... 
- In the USA, 50% of all people will have a chronic condition in 2020, consuming 80% of health care spending

Source: RAND Corporation
China: similar and faster
Implications

• Rethink compartmentalization of regulation/evidence/RDI/investments

• Reformulate MT/MD as one of the three or four main building blocks of health care systems

• Redesign policy & implementation models of LMIC patient needs and demands

• Redesign MT/MD RDI and industry strategies (even “industrial policies”)

• Conceptualize WB/RDB’s investments as funding for health technology systems
Global MT and Device Collaboration Systems

*(Option One or Option Two)*, building on current WHO MT/MD and all the other MT/MD Programs

As with the EU and, e.g., FAA, NASA, Hi-Speed train programs, would need to be done with industry, with finance sector, etc.

*(overcome the current public – private MT dichotomy)*:

- public sector health administrations
- MT and medical device industry
- public and private health insurance companies
- R&D and innovation industry/academia/scientific institutes
- Public & private finance industry & banking

* e.g. the Brussels EU MT meetings, the GHTF meetings, WHO, HTAi, etc. meetings
### Final chapter: Partners & Leadership

**A Global/G-20 MT/MD Health Care System Coalition**

- **Leading Governments:** EU, US, Japan, Canada, China, India, Brazil
- **Industry:** Siemens, GE, Philips, J&J, Baxter, Terumo, Medtronic, Boston Sc., etc.
- **Finance:** MDBs, EIB, AAA commercial & investment banks active globally in health care (e.g. TD, DB, Rabo, CL, GE Cap, HSBC, CCB (CCB China Health Care Investment Fund), Barclays, etc., Micro-Finance Banks (Grameen), and selected Sovereign Funds (e.g. Saudi Arabia & Gulf States)
- **Leading MTA agencies** (e.g. Thailand, Malaysia, China, the UK, Sweden, Canada, the U.S., Holland, etc.)
- **Selected leading and progressive health (re)insurance companies**
- **Leading MT/MD and MTA Academic institutions** (OECD and **G-20 countries**)
- **The leading trade and innovation agencies** from the EU, US, India, China, Japan, Korea, Singapore, Brazil and Mexico
Summary

- MT/MD insufficient a global priority & policy issue now relative to its current standing and future potential

- Expand dramatically:
  - incrementally - current systems
    - globalize (increase LMIC funding)
  - fundamentally - shift from health systems to health technology systems
    (MT/MD at center of health systems reform for 21st century health needs and clients)
    - create global MT/MD institutions & global industrial policies
    - use ‘inclusive’ global partnerships
“Technology is easy to develop. Developing a new attitude, moving the culture, is the difficult part”, Dean Kamen, inventor

Source: The Economist, June 10, 2010
Thank you for your patience and kind attention

Ok Pannenborg
ANNEX
Annex with more details and examples

Extensive version (53 slides) of presentation on

“Health Systems Strengthening and Global Financing for Medical Technologies & Devices: Suggestions for Change”
Health Systems Strengthening and Global Financing of Medical Technology & Devices: Suggestions for Change

by Dr. Ok Pannenborg
Former Chief Health Advisor, the World Bank, Washington D.C.

WHO First Global Forum on Medical Devices, Bangkok, Thailand, September 9-11, 2010
20th & 21st Century Under-Prioritization of Medical Devices and Technology

Evolution of Health Care Focus & Reforms 1950-2010:

- Reconstruction of infrastructure (1945 – 1975)
- Hospitals and medical schools (1960 – 1995)
- Specialization & family and primary health care (1960 – 2000)
- Disease prioritization (cancers, CVD, AIDS, malaria, smallpox, measles, TB, NTDs, diabetes, etc) (1970 – 2005 - .....)
- Pharmaceuticals, incl. R&D and innovation (1980 – 2015)
- Economics & financing (DALYs, CEA, insurance reforms) (1990 – 2010 - ...)
- Health Systems strengthening (1985 – 2015 - .....)


Friday, September 17, 2010

WHO First Global Forum on Medical Devices, Bangkok, September 9-11, 2010

Dr. Ok Pannenborg
Medical devices and technology

+/- 2000/2005

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M-Health, E-Health
Overview: some MD Technology and Financing Developments

• Quality of Care (Donabedian and ever since)
• MT “Assessments” (OTA and ever since)
• IFMBE, ECRI, etc.
• Clinical & Medical Care Implications: DRGs
• Health Insurance modifications
• Government MT/MD Regulations
• Global Harmonization Task Force (& regional bodies, e.g. Asia, Latin-America, etc.)
• NICE
• HTAi and INAHTA— e.g. Dublin 2010

Overview Cont’d
Cont’d - Overview: some MD Technology and Financing Developments

• EU & Industry – Brussels, Innovation in Health Care, May 2010
• Industry expansion and subsequent consolidation (GE, Siemens, Philips, J&J, Medtronic, Boston Sc., Terumo, et al.)
• Macro economics/Industry: innovation and technological change (Solov, Romer, Schumpeter, Freeman, von Hippel, Rosenberg, Nelson, Gelijns, IOM)
• VC dynamics, EU and EIB MT/MD support & financing initiatives
• Global decentralization of care
• Private sector care domination in low- & middle-income countries
MT/MD Progress: crucial, necessary, but insufficient

- Excellent efforts by WHO, the national and international health technology assessment organizations, government agencies, some health insurance companies and medical and biomedical technology companies
- GIHT (the Global Initiative on Health Technologies)
- “refurbished” equipment and devices (positive trends)

But, so far sub-optimal:

A. Technical strategies/policies/practical programs & implementation:
   - policies for MT/MD patient access-to-care as per specific location/situation too weak (all countries, but especially low- & middle-income countries)
   - insufficient attention to affordability (and to some extent accountability)
   - insufficient attention to design for “MT/MD closer to the patient” (e.g. urban/semi-urban and rural in poorer countries/home health care/elderly/etc.)

B. Political & Economic Priority System:
   - only in lower to middle-level power structures (few countries with national political and macro-economic priorities on medical technology)
Medical technology financing examples (big MT-10 excl.)
weak consolidation ?, July 1 – 15, 2010 (1)

- Replication Medical, Inc., raised $1.1 million (implantable hydrogel devices used in spine surgery)
- Sensus Healthcare, LLC, raised $1.5 million (planned $7 million) (medical technology development)
- Figure 8 Surgical, Inc., raised $1.36 million (surgical innovations)
- Seguro Surgical, Inc., raised $125K of a planned $1.25 million (surgical instrumentation)
- Tissue Genesis, Inc., raised $1.33 million ($15.3 million) (tissue engineering and cell therapy)
- BIO2 Technologies raised $1.1 million of a planned $2 million (tissue engineering scaffolds)
- Smart Pill Corp. raised $7.95 million ($9.5 million) (pill camera GI diagnostic)
- Cambus Medical raised $1.89 million (€1.5 million) (advanced catheter component solutions)
- Cappella Inc. raised $3.69 million ($9.9 million) (treatment of bifurcation in coronary artery disease)
- Uptake Medical, Inc., raised $17.5 million in a Series B round (device for treatment of emphysema)
- Neoprobe Corp. raised $14 million (gamma detection technology in sentinel node biopsy)
- Dfine, Inc., raised $36.2 million (minimally invasive treatments of vertebral compression fractures)
- EyeTechCare raised $9.5 million (€7.5 million) (high intensity focused ultrasound (HIFU) for treatment of glaucoma)
- Theranos, Inc., raised $45 million of $100 million (medical devices that monitor drug reactions)
- TriVascular, Inc., raised $60 million (technology for repair of abdominal aortic aneurysms)
- Ventus Medical Inc. raised $40 million in a Series D round (medical device technology for treatment of sleep disordered breathing)
- InVasc Therapeutics, Inc., raised $3.2 million ($12 million) (drugs for kidney disease and atherosclerosis)
- Innocoll Holdings, Inc., has raised $5 million (collagen-based drugs and devices)

Source: U.S. Regulatory Filings Aug. 2010

Total: +/- US$ 342
Medical technology financing examples (big MT-10 excl.)
weak consolidation, July 15 – 31, 2010 (2)

- Vertiflex, Inc., raised $2 million (non-fusion spine surgery technologies)
- Providien, Inc., raised $10.5 million (undisclosed medical technology, investor Endeavor Capital)
- BBARRX Medical, Inc., raised $15 million (endoscopic treatments for GI diseases)
- Invuity, Inc., raised $13.2 million ($16 million) (lighting and visualization in minimally invasive surgical instrumentation)
- EndoStim, Inc., raised $6 million in a Series B financing (device treatment sphincter-related disorders such as GERD and urge urinary incontinence)
- Gentis, Inc., raised $548K ($2.25 million) (orthobiologics products)
- AxioMed Spine Corp. raised $14.5 million (spinal disc implants)
- Nfocus Neuromedical, Inc., raised $3.31 m. ($7.15 million) (device treatment of brain aneurysms)
- Maya Medical, Inc., raised $700K in seed financing (company founded by Avantec Vascular)
- inCyte Innovations, LLC, raised $3 million (undisclosed technology)
- SuperDimension Ltd. raised $9.8 million (technology to detect and map lung cancer)
- USHIFU, Inc., raised $1.02 (10 million) (therapeutic use of high intensity focused ultrasound)
- Devicor Medical Products Group, LLC, raised $151.5 million for development of breast-care technology (Mammotome) from J&J's Ethicon Endo-Surgery.
- IDEV Technologies, Inc., raised $27.7 million ($44.8 million) (biliary stent technologies)
- Sound Surgical Technologies, raised $2.1 m($5 m) (ultrasound liposuction for cosmetic surgery)
- Avedro, Inc., raised $4.58 m. (non-invasive treatment of keratoconus in vision correction)
- InfraReDx, Inc., raised $1.53 million (infrared imaging of blood vessels for catheterization)
- Aethlon Medical, Inc., raised $890K (blood purifier to treat infectious diseases)

Source: U.S. Regulatory Filings, Aug. 2010

Total: +/- U.S.$ 307 million
Good but not-enough:
MDG technology/device examples

- LED phototherapy (a) and non-invasive transcutaneous bilirubin measurement system (b) for hyperbilirubinemia in newborn infants
- Reusable neonatal suction system (asphyxia & neonatal resuscitation)
- Fluorescence visualization system for cancer screening (e.g. oral/oropharyngeal cancers)
- Isothermal nucleic acid amplification system for TB diagnosis (point-of-care alternative to sputum smear microscopy)

Source: WHO
Current MT Concept – also crucial and necessary but insufficient

Source: WHO
Pharmaceutical Innovation & Technology – comparison (1)

Pharma globally better consolidated, incl. biotech and start-up financing & venture capital; prominently positioned in:

- clinical interventions
- prevention & public health

**Global pharma now a structural power in health care systems** (insurance, effectiveness, financing, R&D and innovation, plus as a major building block of national health systems in infrastructure, staffing, quality standards, budgets, etc.)
Pharmaceutical Innovation & Technology – comparison (2)

In comparison, MT and MD so far remain at lower and middle levels in:

- politics
- management
- national & global prioritization (health, industry, RDI, trade)

+ culture of “regulation & control” (see WHA Resolution 60.29)

Public & private global MT/MD reality changing
(this First Global MT/MD Forum an important international expression of this trend)
Examples of global MT/MD change

Health care transforming technologies

Source: H. Hofstraat, Philips Medical Research
E.G.: Tissue factor targeting with nanoparticles

...Vulnerable Plaque can be imaged, located and quantified

Source: H. Hofstraat, Philips Medical Research
non-pharma MT results

And subsequently treated...

Source: H. Hofstraat, Philips Medical Research
Other example: Molecular Imaging

Assessment of biological processes in vivo, at the cellular and molecular level

• Earlier detection and characterization of disease
  – Much faster than invasive conventional techniques such as histological analysis

• Evaluation of treatment
  – Assess therapeutic effectiveness at the molecular level, long before phenotypic changes occur

• Understanding of biology
  – Study pathogenesis in intact microenvironments

Source: H. Hofstraat, Philips Medical Research
cont’d molecular medicine

The Impact of Molecular Medicine:  
Improving the Health of the Nation (NIH position statement)

- **Early diagnosis/prevention/selection**
  - Big 3: Cardiovascular, Cancer, Stroke

- **Disease mechanisms**
  - e.g., islet beta cell mass in diabetes, detection of inhaled pulmonary pathogens, cellular effectors of (auto)immune diseases, neuro(psychiatric) disorders (amyloid, etc.)

- **New therapies**
  - Receptor-targeted drug/gene therapy
  - Stem cell imaging/tracking
  - Organ/tissue transplantation: function/rejection

- **Surrogate endpoints for clinical trials**

- **Bioterrorism: early warning**

Source: NIH
So, in the face of these seemingly dramatic changes in the MT/MD universe, are we comfortable going forward with the existing international structure and financing for global MT/MD?

- Deepening of the medical devices financing (venture capital, commercial & investment & development banking), industrial & government management, public/private procurement, national & some international regulation, and the variety of quality assessment systems we currently have in most OECD and middle-income and some lower-income countries???
Or, time to reconsider the excellent MT/MD efforts of the last 20 years and take the next step: consider redefining health care systems and health care practice in terms of 21st century medical technology & devices for the majority of people in the world and those most in need?

Thesis: that future health care, in richer and poorer countries, will increasingly come to be determined by medical & health devices across the technology spectrum (and that ‘demand’ will follow)

➤ at fundamental level and incremental level
Fundamental level: Genesis Redux – Synthetic Biology

Falling Cost of synthesizing DNA

“New life”: JCVI-syn1.0

Source: Robert Carlson, Bionics

Synthetic biology industry from algae

Source: The Economist, May 20, 2010
Incremental MT innovation (1): new sensitive detection devices for routine use

Rapid and compact system for DNA detection

e.g. bacterial infection (point-of-care, small lab)

Source: H. Hofstraat, Philips Medical Research
Incremental (2): expansion of imaging (intervention) coverage

Source: H. Hofstraat, Philips Medical Research
Incremental (3): impact of nanoelectronics on molecular specific & sensitive therapies

- **Minimally invasive surgery/therapy**
  - e.g. high precision, image guided surgery

- **Fully functional, integrated, implants**
  - e.g. taking over essential bodily functions: hearing (cochlear), sight (retina), heart (ICD), neural (pain relief, paralysis repair)
  - e.g. providing autonomous drug delivery (sensor & actuator), resolving chronic diseases: smart pill

- **Many more options**, e.g. “camera pill”, intelligent catheters, ...

Source: H. Hofstraat, Philips Medical Research
Option One - modest change: financing the current medical device and technology universe, but with some new means

- Commercial, investment and development Banks: targeted on low- & middle-income countries and specific populations
- Other multilateral financing (LMIC funds): devices across the prevention- clinical-outreach spectrum for needs/demands of women/infants, elderly, rural trauma patients, etc.
- Venture capital, venture loans, venture lease, etc. (non-OECD G-20)
- MT more at the center of health policy (home health care, minimally invasive MT, health care IT [intelligent diagnostic software], etc.
- MT more at center of project formulation (bi- & multilat. ‘projects’)
- Create Global MT/MD Innovation Funds (a la ............[SBIR]
- Engage with MT companies for future LMIC markets and investments
- Create UN and bilateral and EU innovation and stimulation “programs” a la Eureka, Esprit, etc. (see European Investment Bank – Philips case*), but with an initial focus on MICs (India, Brazil, China, Chile, Turkey, SA, Mexico, Iran, Russia, etc.)

*(see EIB Risk Sharing Finance Facility, 2010)
Cont’d Option One: some implications

• Continue with verticalization by medical specialty, but more emphasis on specialties relevant for LMIC populations, rural health care, very poor & remote populations, etc.

• Continue with financing per fee-for-service or specialty department, but with DALY and poverty-related prioritization

• Continue with fragmentation per device, but with explicit specifying of device relevance for MDGs

• Continue with fragmentation classification of diagnostics, labs, treatment and intervention, prevention, rehabilitation, PT, etc.
Recognition of MT Change, but stay with existing systems classifications: IOM

Option two: Structural Change

Both OECD and LMIC Health as Medical Technology-driven Health Sectors and Systems of the Future

Think about it: one large integrated medical technology sequence, that has logical causality and diagnostic, preventive, therapeutic and rehab care algorithms that make “system” and ‘macro-financing’ sense and encompass all medical devices necessary to respond to (a) functional requirements (patient health in terms of his or her needs and demands; and (b) intended and planned health and medical “results”

Early examples: GE and Mount Sinai agreement
Siemens MES agreements (Spain, U.K.)
Philips-SpineMark system (Turkey, Spain, NL)
Underlying Premise: modify concepts of health care and health systems

- Recognize that 21st century development and economies will largely be determined and shaped by technology and technological innovation
  (in economics they went from obscure variables to the dominant variable now)
- **Recognize that health & medicine – also health & medicine in poorer countries** [see the astounding health effects of mobile phones in remote and rural areas] are likely to also be increasingly defined and driven by medical, biomedical and IT technology and innovation
Health Systems  Health Technology Systems

health systems in most countries are slowly becoming health technology systems and health care is increasingly a matter of medical technology interventions and medical device interactions

- can be lamented (‘human touch’, ‘art’ of medicine, etc.)
- counter de-humanization (‘humanize’, can be done)
- major implications for financing
Criticism: only OECD and urban LMIC countries scenario

However:

- China now second largest economy in the world
- US, Europe and Japan becoming increasingly “equal” to actual practice and health systems in Brazil, China, urban and semi-urban India, Mexico, Malaysia, Turkey, the Middle-East, urban South Africa, Kenya, Nigeria, Senegal and Russia
- With tele-medicine, cell-phone technology, IT recognition systems, automated diagnostics and module device maintenance, as well as local and regional micro-finance and decentralized private and public/private investment vehicles, even LMIC rural and PHC care becomes health technology-driven and device dependent (ref. China community health centers)
Now, what about costs?

- One of the main opposition arguments to development and adoption of new MT/MD is “costs”
- Overall attitude and atmosphere as to new MT/MD: negative because of perceived incremental costs
- Multiplier effect of hospitals on budgets: “against”, “njet”
- Current preoccupation: overuse ‘imaging’
Cont’d - what about costs

Consider though:

**Increasing Prevalence and Burden of Chronic Diseases**

- Main cause of death for 50% of people worldwide
- By 2020, chronic diseases will account for almost three fourths -75%- of all deaths worldwide ..... 
- In the USA, 50% of all people will have a chronic condition in 2020, consuming 80% of health care spending

Source: RAND Corporation
China: similar and faster

China: 2010

China: 2050

Source: U.S. Census Bureau, International Data Base.
Cont’d - Cost & Causes

**Main causes of death:**

- Cardiovascular disease
- Cancer
- Diabetes
- Infectious diseases – TB, malaria, AIDS (quality of life)
- Neuro-degenerative – Alzheimer’s, Parkinson’s, etc.
- Auto-immune diseases – Rheumatoid arthritis, etc.

*Sensitivity to all these diseases is partly genetically determined.*
*Treatment is more effective when disease is detected early*

*Delaying the onset of Alzheimer’s for 1 year would save about US$ 20 billion in the United States alone*
Mainly Population
Forecast Change in Medical Care Share of GDP, 
Demographic Change Only, 2000-2050

Source: AN INTERNATIONAL LOOK AT THE MEDICAL CARE FINANCING PROBLEM
David M. Cutler. Harvard University, July 2003
Forecast Change in Medical Care Share of GDP, Demographic **and Health Cost Changes**, 2000-2030

Source: AN INTERNATIONAL LOOK AT THE MEDICAL CARE FINANCING PROBLEM
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Way forward: “outside the box”

- Step out of MT and MD orientation as a relatively small sub-issue of medical care and public health

- Create macro conceptualization of MT as a dominant issue of society, of economics, as a major health systems component and as a new approach to solutions for LMIC health challenges, incl. MDG challenges

this has not happened yet: the [2009 Brown/Zoellick Task Force on Financing of Health Systems Strengthening](#) so far does not include medical technology and medical devices as a major determinant of the systems’ performance and ability to produce results
Medical Technology & Devices: **large capital goods**

Comparable Investment & Finance Approaches:

- Aviation & aircraft
- High-Speed trains
- Nuclear energy reactors
- **Space Programs** (US, EU, China, Russia, Japan, India, Brazil)

**all long term large capital goods investments**

Large MT and devices similar nature (see EMI example – high “entry” threshold, high maintenance and “integration” costs

Therefore only limited number of global players and countries (..................)
Let’s return for a moment to the Pharma and Medical Device & Technology comparison

- Pharma: mostly verticalized per specialty
- Medical Technology: could be horizontalized across all medical and health functions

In terms of health systems strengthening and health systems financing, horizontal integration can be more powerful for political and economic and financial decision-making

**N.B.** The potential rapprochement among the pharma and (bio)MT industry and sciences is recognized of course, despite some fundamental differences between the two (e.g. IP approach)
Horizontal MT/MD integration currently weak

Source: modified from Hofstraat, H., UvA, 2007
Early detection with modern MT/MD integration with health results and cost and finance implications

21st century MT/MD integrated across the health & medical care spectrum

Source: modified from Hofstraat, H., UvA, 2007
Global Pharma and MT/MD Structures

GAVI – pharma
MMV – pharma
TB Alliance – pharma
HIV/AIDS PPPs – largely pharma
TDR – largely pharma
Clinton – largely pharma
EDCTP – largely pharma clinical trials

PLUS – global pharma industry structures – IFPMA, firm-academic interactions, government pharma funding programs [research and provision/subsidies, etc.]

Some global MT partnerships, but hardly equivalent

- **Global MT Diagnostics Fund** ?
- **Global MT Maternal Health MDG-5 Program** ?
- **Global MT Family Planning Program** ?
- **Global MT Diabetes Program** ?
- **Global MT Malaria Fund** ?
- **Global MT TB Fund (e.g. re: diagnostics)** ?

Exception to some extent: Bill & Melinda Gates Foundation
Consequent global/regional MT/MD institutions (consider global U.S. decline 2010 – 2040)*?

**Global MT FDA** – partly underway, FDA international programs, plus July 2010 FDA – FCC Program for Medical Technology Wireless and new US$ 400 million Medical Technology Internet Infrastructure Program

**Global MT NIH** – partly underway, all the NIBIB programs

**Global MT EU Program** – a la EUREKA and ESPRIT, but more MT specific – with similar government, industry, trade, RDI and sector focus collaborating

**Global MT Fund / Agency ?** - global public good function for all MT of the above, beyond the U.S. and EU – for joint stimulation, innovation, regulation, evaluation and funding.

*Robert Vogel, Nobel Laureate, “134,000,000,000,000.00”, 2009*
Global MT and Device Collaboration Systems
(Option One or Option Two), building on current WHO MT/MD and all the other MT/MD Programs
As with the EU and, e.g., FAA, NASA, Hi-Speed train programs, would need to be done with industry, with finance sector, etc.

(overcome the current public – private MT dichotomy)*:

- public sector health administrations
- MT and medical device industry
- public and private health insurance companies
- R&D and innovation industry/academia/scientific institutes
- Public & private finance industry & banking

* e.g. the Brussels EU MT meetings, the GHTF meetings, WHO, HTAi, etc. meetings
Example of joint effort for modern MT approach

Building Molecular Medicine Center – Industry, Academia, Government, Multilateral and Global

Source: H. Hofstraat, Philips Medical Research
Current Global MT Financing: mostly traditional public sector MT/MD funding

• Large **national** investments, but highly fragmented (haphazard by device, by country, by hospital case, by health insurance agreement)

• **Bilateral funding**: mainly low-income countries, fragmented, low quality, low effectiveness

• **Multilateral funding**: weak, not central to investment operations, low expertise in both multilateral agency and country counterpart (e.g. WB, ADB, AfDB, IADB, GF, GAVI, EU, etc.)

• **Micro-finance**: mainly PHC, better collaboration with industry, but still fragmented and trying to find its way
But: along the **Option One and Option Two** lines: Increasingly Medical Technology driven by **Private Sector Hospital Financing**

- TPG & Carlyle Group - Healthscope (Australia & South-East Asia)
- Fortis Health Care (India) and Khazanah (Malaysia) – Parkway Holdings (Singapore + other Asian countries)
- Rana Mehta (Technopak , India): **African countries next**
Health [Technology] Systems approach implications for global financing

- Low-income countries: funding for “health technology system projects”, with at their center investments in medical device “care results”, staff expertise for managing these, life-cycle equipment contracts, IT, clinical performance and prevention and public health outreach through and with technology devices (e.g. telemedicine for diagnostics, wireless for treatment, etc.).

- World Bank, AfDB, ADB and European Investment Bank funding would fund the overall integrated technology “package” and formulate the investment fundamentally different in terms of “results” and “performance” and define preparation, assessment and evaluation of the operation radically different from today, aiming for a consolidated technology results and health systems project, with more robust macroeconomic growth & financial rates.
Initiate a global MT/MD Health Systems Coalition that explicitly includes as main shareholders:

- Leading Governments: EU, US, Japan, Canada, China, India, Brazil
- Financial institutions: multilateral development Banks, the European Investment Bank (EIB), AAA commercial & investment banks active globally and in health care in Asia, Middle-East, Latin-America and Africa (e.g. TD, DB, Rabo, CL, GE Cap, HSBC, CCB (incl. CCB China Health Care Investment Fund), Barclays, etc., Micro-Finance Banks (Grameen), and selected Sovereign Funds (e.g. Saudi Arabia & Gulf States)
- The world’s leading MTA agencies (e.g. those from Thailand, Malaysia, China, the UK, Sweden, Canada, the U.S., Holland, etc.)
- Selected leading and progressive health (re)insurance companies
- Leading MT/MD and MTA Academic institutions (both OECD and G-20 countries)
- The leading trade and innovation agencies from the EU, US, India, China, Japan, Korea, Singapore, Brazil and Mexico
Initiating Leadership 2012

➢ Thailand, China & Singapore
  (Ministers of Health j* Commerce/Trade Ministries)
➢ WHO (DG)
➢ World Bank (President)
➢ Two or three MT CEOs (a la GSK)
➢ Two or three AAA global and microfinance banks
  . (Rabobank, Grameen, TD)
➢ Bill & Melinda Gates (technology-orientation)

(ref: WB/WHO/Pharma CEOs at UNGASS for NTD drugs for low- & middle-income countries, Sept. 20, 2010, NY)
“Technology is easy to develop. Developing a new attitude, moving the culture, is the difficult part”, Dean Kamen, inventor

Source: The Economist, June 10, 2010
Thank you for your patience and kind attention

Ok Pannenborg
Global MT and Device Collaboration Systems (Option One or Option Two), building on current WHO MT/MD and all the other MT/MD Programs

As with the EU and, e.g., FAA, NASA, Hi-Speed train programs, would need to be done with industry, with finance sector, etc.

(overcome the current public – private MT dichotomy)*:

- public sector health administrations
- MT and medical device industry
- public and private health insurance companies
- R&D and innovation industry/academia/scientific institutes
- Public & private finance industry & banking

* e.g. the Brussels EU MT meetings, the GHTF meetings, WHO, HTAi, etc. meetings