Foresight Taiwan

Rethinking Science and Economic Growth

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Outline

- What is “FORSIGHT?”
- Context: Economic Growth
- Framework for Foresight Taiwan
- Program
- Status

What is FORESIGHT?

- A forward look into S&T for
  - a challenging vision of the future
  - an effective strategy now
- Originated in UK as basis for S&T policy
  - Finnsight 2015
  - Innovation 25 (Japan)
  - and many others (e.g., EU, Korea, FUTUR)
- Foresight Taiwan
  - commissioned by Ministers Chen and Lin

Finnsight 2015

- Joint project of Tekes and Finnish Academy
- 10 panels and 120 experts
  - Delphi methodology
- Stated objective: identify *focus areas* for mandated Centers of Excellence in S&T
- Ten principal themes:
  - learning, service, health, environment, security
  - Bio, ICT, materials, society, global economy

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Outcome: Sample Focus Areas

Service

- consumer services
- business competence
- service export
- IT in service
- recreation & tourism
- service & living environment
- public service

Materials

- printed electronics
- surface technology
- wood and biomass
- carbon (nanotubes)
- electronic and photonic materials
- biomimetics & bio-materials
- polymers

My Observations

- Disappointing outcome in most Foresight projects
  - too general and generic
  - assumptions not well tested
  - hard to find much new in the results
- Likely cause
  - asking the (same) wrong questions
  - driven by agendas
  - needs a fresh conceptual framework

Point of Departure

Foresight Institute, London:

"The starting point for a project area is either:

a key issue where science holds the promise of solutions; or,

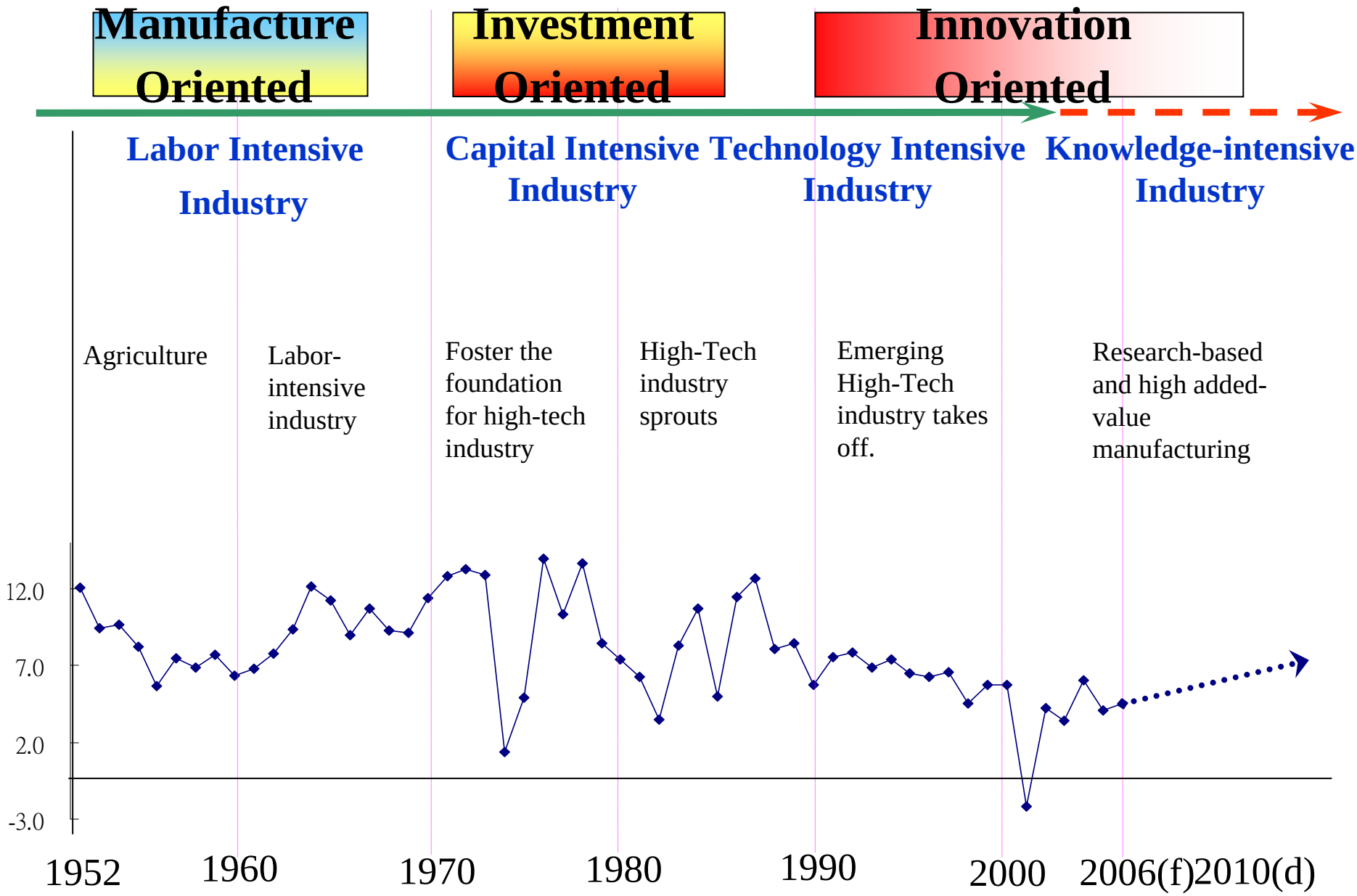
an area of cutting edge science where the potential

applications and technologies have yet to be considered and articulated."

A Framework for Foresight Taiwan

- Choose a major specific issue:
  - economy, health care, environment, energy, manpower, etc.
- Framework:
  - achieve deeper *understanding*
  - generate *strategic options*
  - develop *implementation plan*
  - seek to *impact policy*

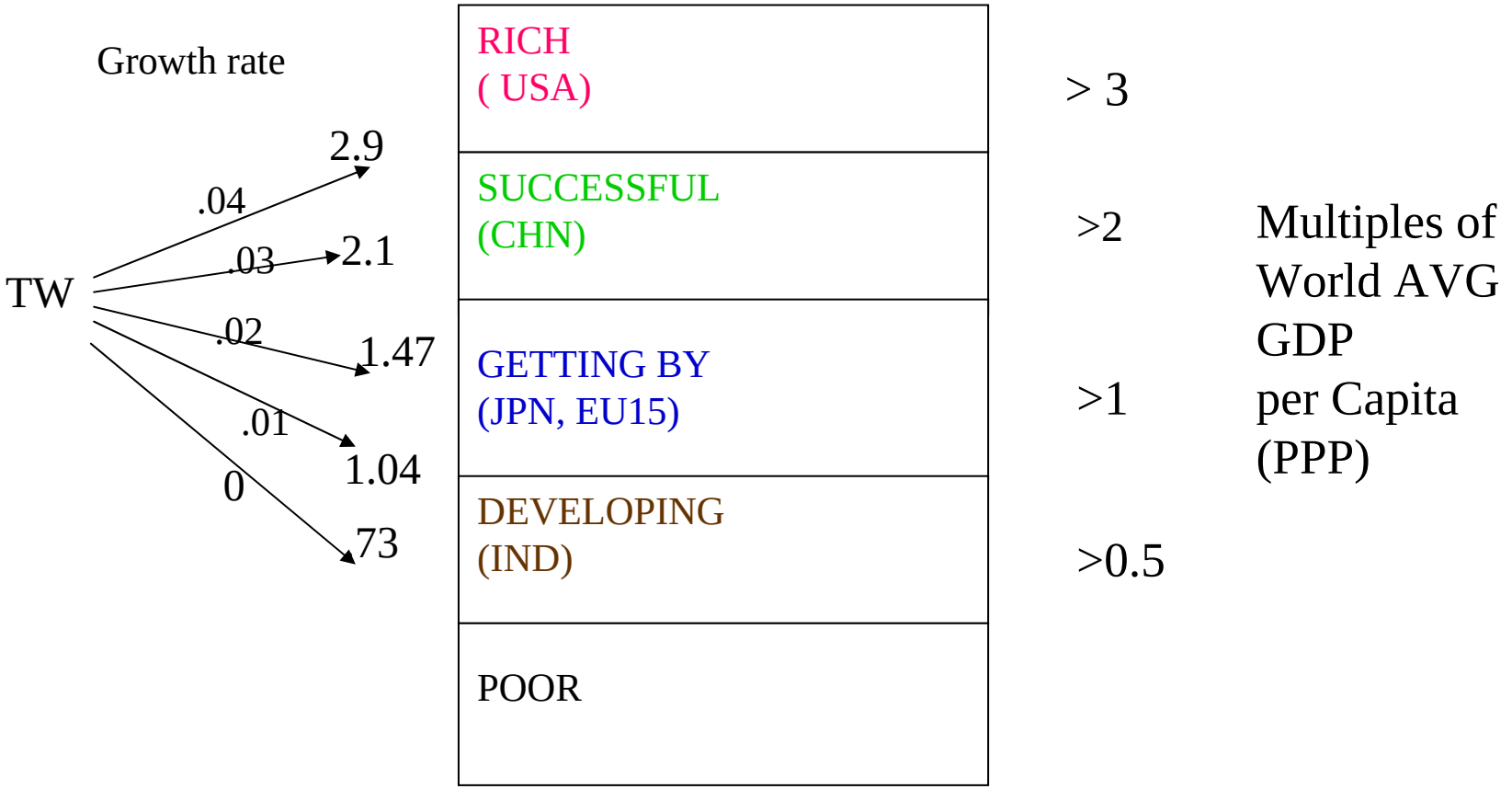
50 Year Growth History of Taiwan/ MOEA



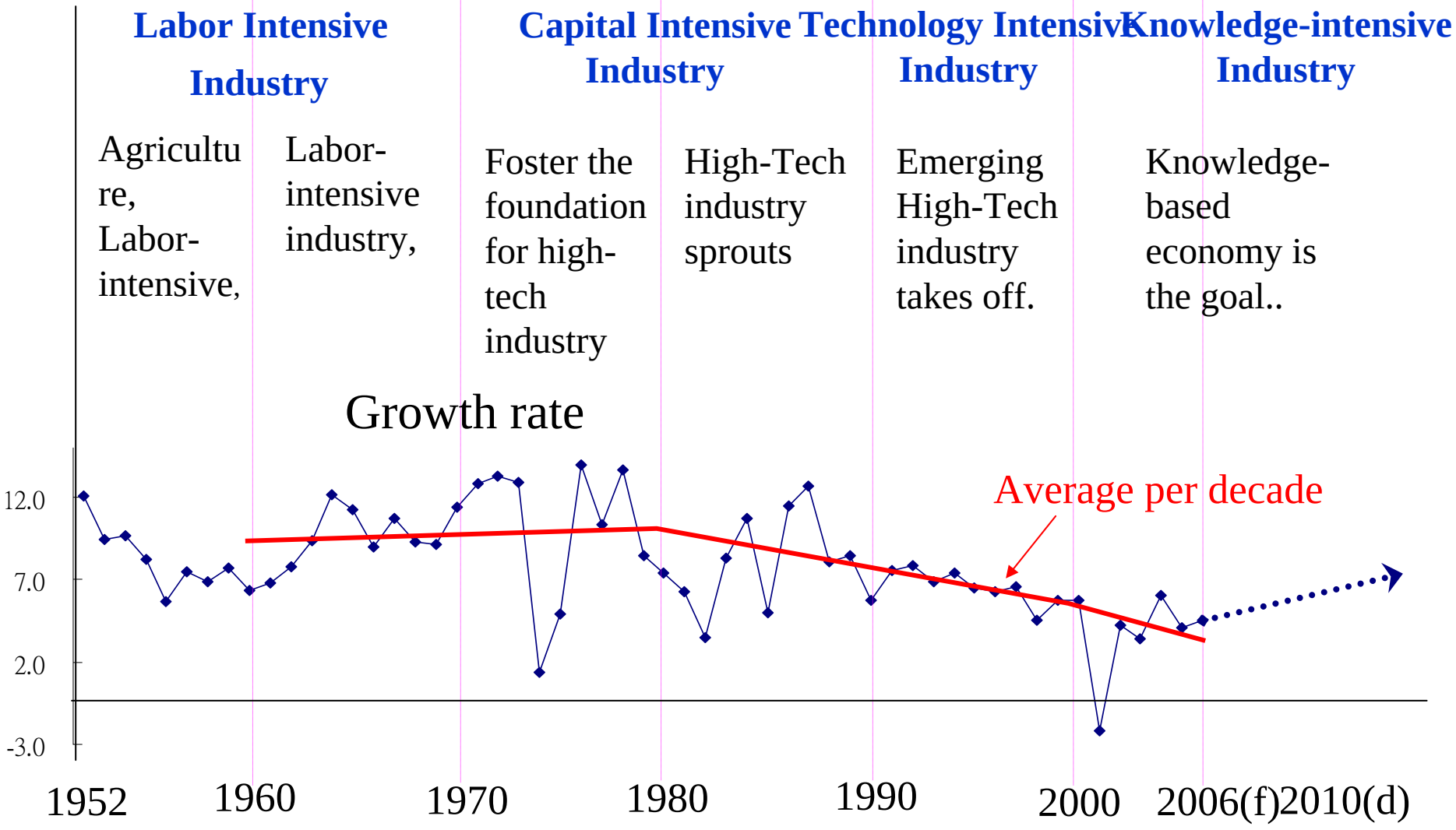
The World Now

The World in 2040

Fogel (Daedalus 2007)



Growth Rate Revisited



Seeming Paradox?

- Growth rate highest in low-tech period
- Steady decline during the high-tech boom
- Modern growth theory:

  technology improvement + human resource development = increasing returns to scale
- Where was the accelerated growth in the high-tech boom years?

Paradox Resolved?

- Initiation of industrialization triggers intrinsic forces
  - education: illiteracy removed
  - sector-shift: agriculture to manufacture
- Most of the productivity gains are due to these two forces
- When these forces are spent, growth declines
- Technological gains from Low-Tech to High-Tech not as great as sector shift

Hypothesis

- Continual improvement within the industrial sector is not enough
- Need discontinuous (disruptive) change
- Two possible sources for such change
  - new shift: manufacture to service
  - new industries based on early stage technologies

Three Legs of Economic Growth for Taiwan

- Electronics (ICT)
  - basis of current prosperity, but maturing
  - business model innovation
    - modularization of global value chain
    - first mover in business, not technology, innovation
- Service
  - 70+% of GDP and increasing
  - under-performing in every respect
- Early Stage Technology
  - biotechnology and what else?

Focus on the Service Sector

- A new sector shift with large potential productivity gains
- Great disparity in added value among services, from shoe shining to international finance
- Relative to Hong Kong and Singapore, Taiwan is not making a good transition
- Highly leveraged opportunity for Taiwan
- What is role for S&T?

Technology Based Transformation of Services

- Financial Services
  - risk management
  - model based pricing of financial products
- Professional services
  - model based geological services
  - information based health services
  - service at a distance (e-service)
- Use Taiwan's S&T strength as a wedge

Early Stage Technology

- Operative definition:

  early stage = ability to launch an industry that does not yet exist

- How to produce early stage technology?
  - scientific discovery and invention
  - acquisition
- Both are difficult
  - long term bet that requires patience
  - few nations have succeeded

Initial Questions for Foresight Taiwan

- Are there discoveries already made that would be the basis for early stage technologies?
- Are there technology transformed services ready to be launched in which Taiwan has a competitive advantage?
- How can one get more?

Methodology

- Rejected a survey, data base search, or expert polling approach
- Engage the very community that will provide the source of discoveries and services that we are looking for
- Designed a three part funding program
  - translational research
  - acquisition
  - service

Three Parts Explained

- Translational Research
  - identify discovery already made
  - present plan to move toward usable technology
- Acqusition
  - present cogent plan for identifying and acquiring early stage technology
- Service
  - identify service and technology
  - identify competitive advantage

Program Parameters

- To fund up to 12 projects at up to NT$15 million each for one year
  - 6-8 translational, 2-3 service, 1-2 acquisition
- Announcement 10/01/07
- Pre-proposal due 10/19/07
- Full proposals due 11/23/07
- Decision: being made right now
- Projects to start 01/01/08

Status

- 100 pre-proposals were received
- 27 were invited to submit full proposals
- 26 did submit
- Preliminary review result
  - 9 were found worthy of funding
- I was told to have low expectations
- The result far exceeds any reasonable expectation

What Next?

- This is the end of the beginning
- Whether the PI's will make a genuine effort toward translation remains to be seen
  - quarterly reporting sessions
- Should there be a follow-on program? What?
- Should there be an another round?
- Where is the implementation plan?

Some Observations

- Clearly, researchers in Taiwan are making some significant discoveries worthy of translation.
- The service sector is weak
  - especially financial services
  - what to do?
- Surprising interest and ideas on acquisition of early stage technology