



# **TAKING FULL ADVANTAGE OF OPPORTUNITIES BY MOVING AHEAD OF THE GAME**

**Why understanding technological trajectories matters for success**

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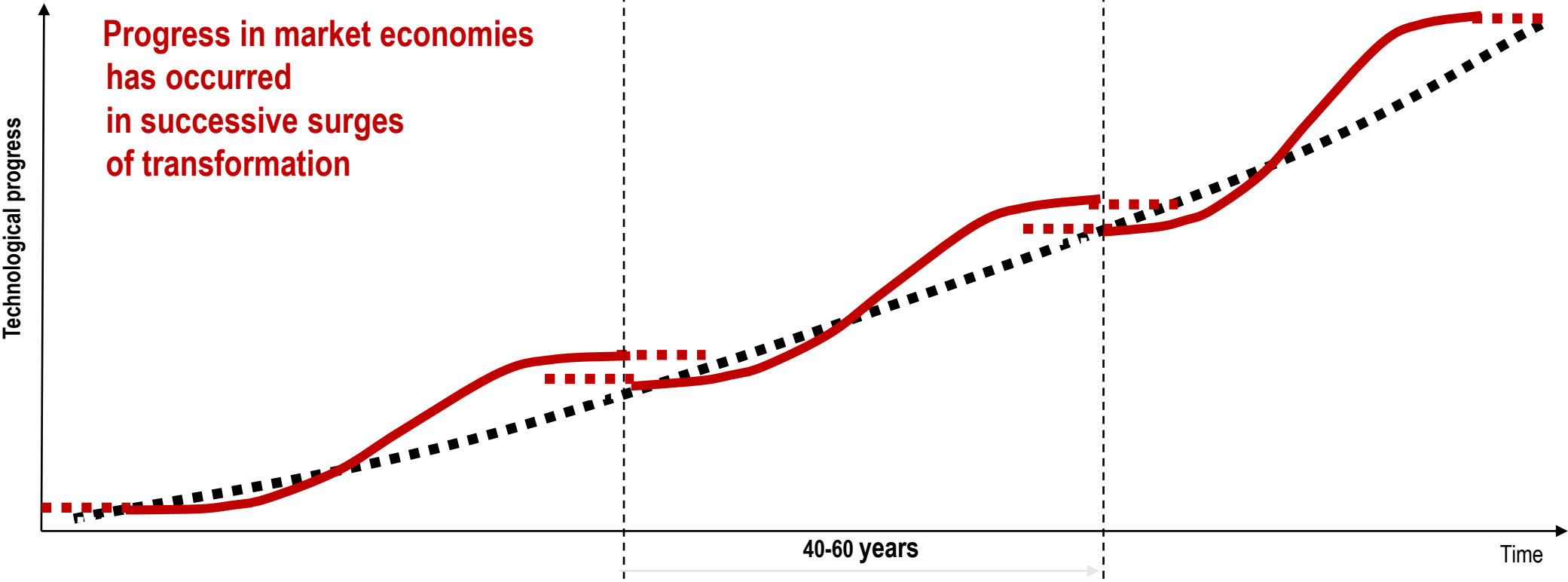
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**Brazil** Entrepreneurial Mobilization for Innovation **MEI December 2021**

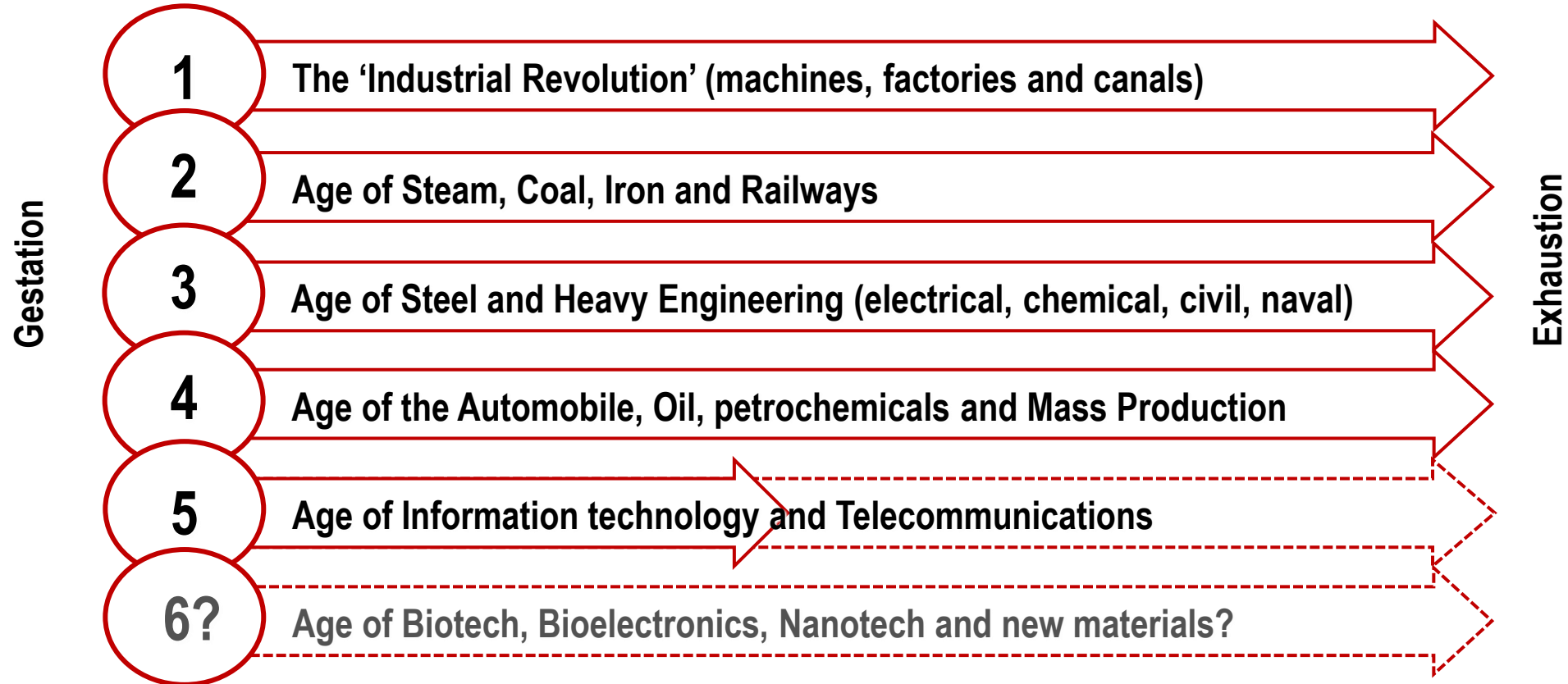
- **Technical change occurs by revolutions**
- **Development opportunities are a moving target**
- **The current opportunity is of a multiple nature**

# TECHNOLOGICAL ADVANCE IS CONSTANT BUT NOT CONTINUOUS



**EACH DEFINES A DIFFERENT PARADIGM  
DIFFERENT INVESTMENT AND INNOVATION OPORTUNITIES  
AND DIFFERENT WAYS OF PRODUCING AND LIVING**

## FIVE TECHNOLOGICAL REVOLUTIONS IN 240 YEARS



**Understanding how they evolve**

**HELPS US IDENTIFY THE CHANGING OPPORTUNITIES**

Because each revolution brings a change of paradigm  
**IT NOT ONLY CHANGES 'WHAT' IS PRODUCED BUT ALSO 'HOW'**

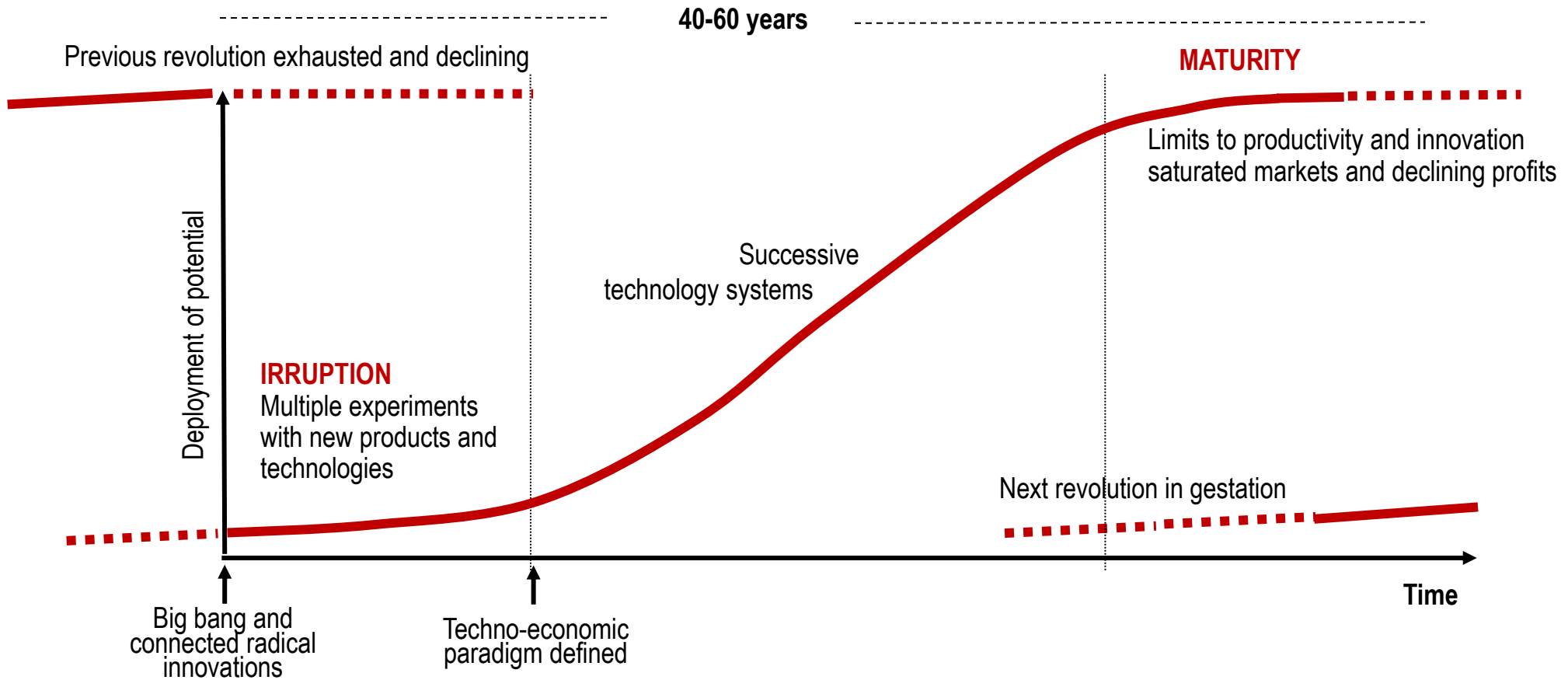
While the new industries emerge  
some of the existing industries are eliminated or replaced  
and many others are 'modernised'

**IT IS A MAJOR OVERHAUL OF THE ECONOMY**

**THE BETTER WE UNDERSTAND  
THE NATURE OF THE CHANGES AND THE OPPORTUNITIES IT PRESENTS  
THE MORE LIKELY IT IS THAT WE WILL SUCCEED**

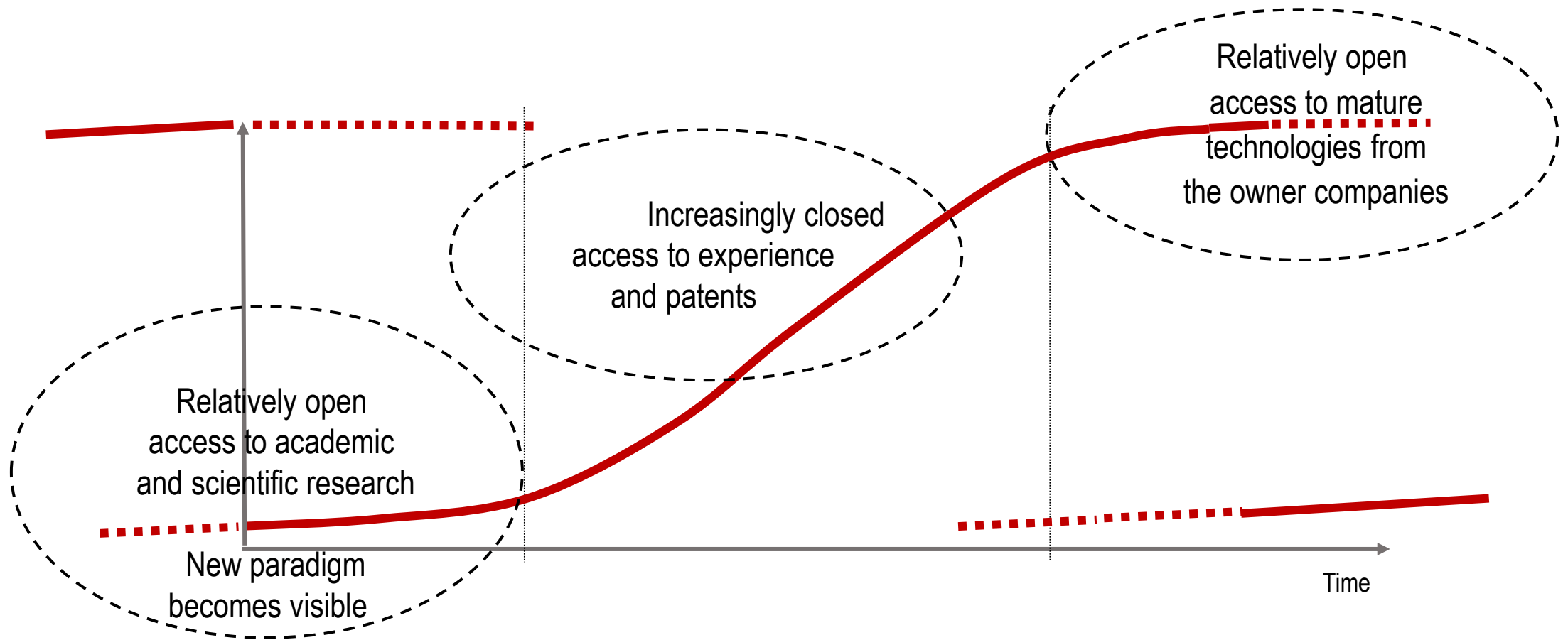
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# THE TRAJECTORY OF EACH REVOLUTION FROM IRRUPTION TO MATURITY



Along the process different windows of opportunity open and close

**THE FORMS OF ACCESS TO THE NECESSARY KNOWLEDGE CHANGE ALONG THE TRAJECTORY**



**The earlier you enter, the more independent you are to innovate and the greater the growth ahead**

**DIFFERENT OPPORTUNITIES LEAD TO DIFFERENT OUTCOMES**



**The Latin American process of import substitution industrialization**

(including the 'Brazilian miracle' 1960s-1980)

**took advantage of the maturity phase  
of the mass production revolution**

**THE MAJOR CORPORATIONS WERE DESPERATELY LOOKING FOR MARKETS**

**HAVING A LARGE POPULATION**

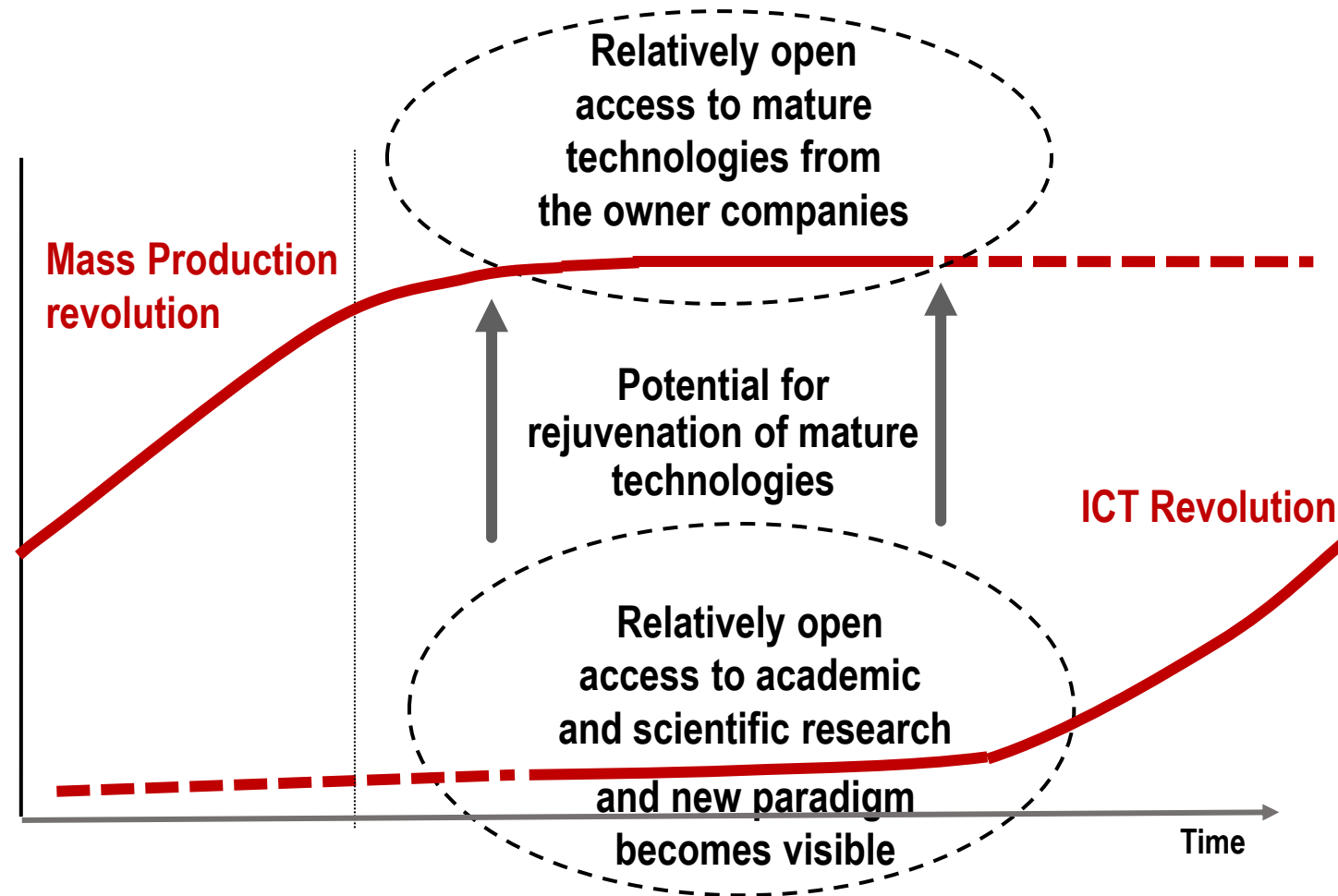
(especially if it's not too unequal)

**MAKES IT POSSIBLE TO ACHIEVE FAST GROWTH WITH PROTECTION**

**But to make the final leap to development**

**YOU MUST ALSO ENTER IN THE EARLY PHASES OF A REVOLUTION**

# THE 'FOUR ASIAN TIGERS' TOOK ADVANTAGE OF THE DOUBLE TECHNOLOGICAL OPPORTUNITY



**That is how the Koreans took over the shipbuilding industry and others... and soon memory chips  
LATER -- AND IN A DIFFERENT WAY -- THAT IS WHAT CHINA HAS DONE TOO**

**THE MOST SUCCESSFUL CASES OF TRANSITION AND LEAPING FORWARD**  
(USA and Germany 1870s-1914; Japan, the 'Four Tigers' 1970s-80s and now China)  
**HAVE BEEN STRONGLY SUPPORTED**  
**BY A PROMOTING OR DEVELOPMENTAL STATE**

**Import substitution industrialization in Latin America**  
**including the Brazilian miracle**  
**also depended on government support**

**BUT THE LEAP DEPENDS ON THE NATURE AND SIZE OF THE OPPORTUNITY**  
**on the adequacy of the policies**  
**and on the capacity of the private sector to take advantage of it**

**TECHNOLOGICAL REVOLUTIONS EVOLVE AS A SUCCESSION  
OF OVERLAPPING TECHNOLOGY SYSTEMS**

**AND SYSTEMS EVOLVE AS A SUCCESSION  
OF OVERLAPPING INDIVIDUAL TECHNOLOGIES**

**And they all behave in S-curve fashion  
opening similar opportunities at the early and late phases of diffusion**

**BUT THE STAGE OF THE REVOLUTION ALWAYS MATTERS!**

**Artificial intelligence (AI) is a system in its early stage  
but the ICT revolution is mid-way along**

**So it's possible, but not so easy, to enter AI and grow to be a Google**

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# THE CURRENT OPPORTUNITY SPACE IS MADE UP OF THREE MAJOR FACTORS

## The current ICT revolution and its paradigm

The new AI, robotics, internet of things, etc.

Continuing the shifts  
from products to services  
from tangible to intangible  
from standard to customised  
from single to multi-purpose  
from pyramids to networks  
and so on

The capacity to innovate in all sectors: agriculture, materials, manufacturing, processing and all services

## The environmental transition as direction

The shift from fossil energy to renewables

The radical reduction of waste, materials use and energy intensity

The increase in rental rather than purchase in maintenance in recycling, etc.

The new emphasis on health and nutrition.

Forest preservation

## The next revolution in gestation

Major innovations in materials and biotechnology

The beginnings of a revolution in food, and medicine

CRISPR, microbiome, mRNA, photogenetics, etc.

New developments in agriculture and food production (including labmeat, etc.)

Advances in nanotechnology for materials and health.

Bioelectronics

**The three combine to make a wide ranging multiple opportunity space**

**IN THE LIGHT OF THOSE OPPORTUNITIES  
LATIN AMERICA COULD SPECIALIZE  
IN HIGH-TECH NATURAL RESOURCES**

**That means revolutionizing the methods of production  
as well as the variety of products  
and their customization for specific uses**

**AND BRAZIL COULD BECOME A WORLD LEADER  
IN GREEN AND CUSTOM MATERIALS AND FOOD**

**AND IN THE CORRESPONDING CAPITAL GOODS AND SERVICES  
while continuing to serve the domestic and nearby markets for consumer goods**

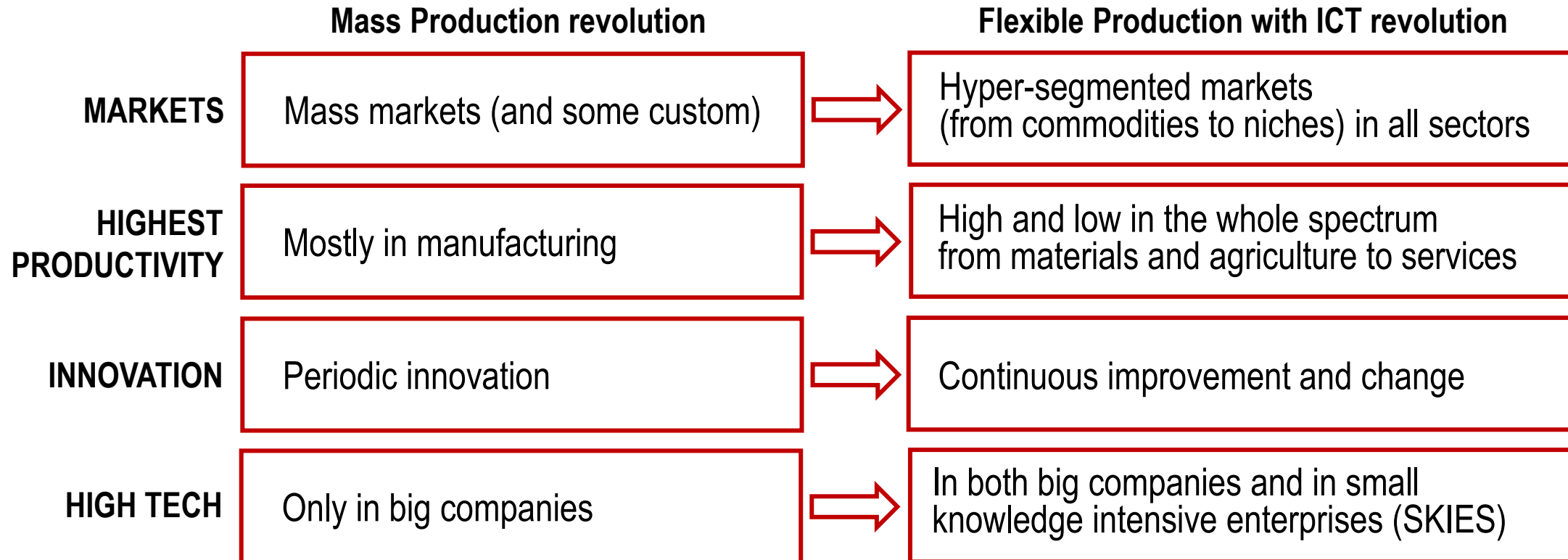
**BUT TECHNOLOGICAL REVOLUTIONS  
DO NOT ONLY CHANGE THE 'WHAT' AND 'HOW' OF PRODUCTION**

**THEY ALSO CHANGE  
THE NATURE OF MARKETS  
THE TYPE AND ORGANIZATION OF FIRMS  
AND THEIR INTER-RELATIONS**

**Success will also depend on understanding  
and taking full advantage of those changes**

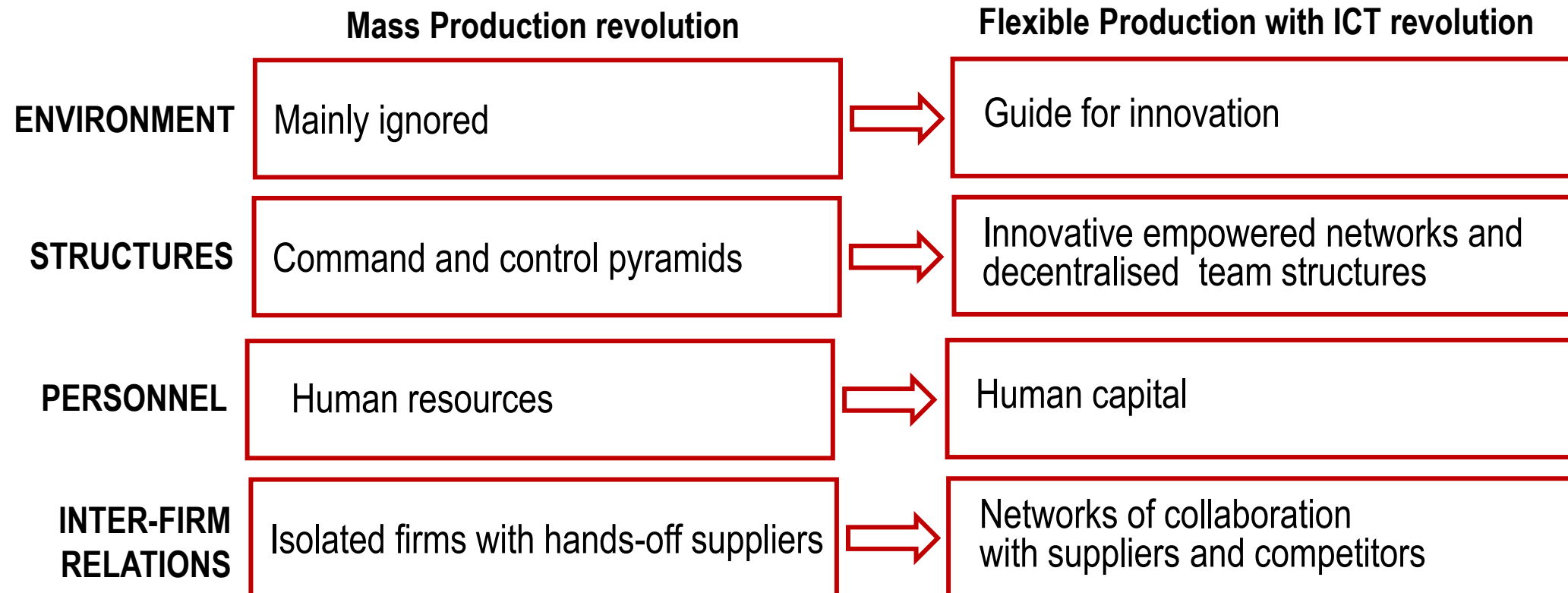


## What has changed in markets and innovation?



**GROWTH, SURVIVAL AND COMPETITION NOW DEPEND ON CONSTANT INNOVATION**

## What has changed in organizations and relations?



**AND CONSTANT INNOVATION DEMANDS AGILE STRUCTURES AND NETWORKS WITH INNOVATIVE PERSONNEL**

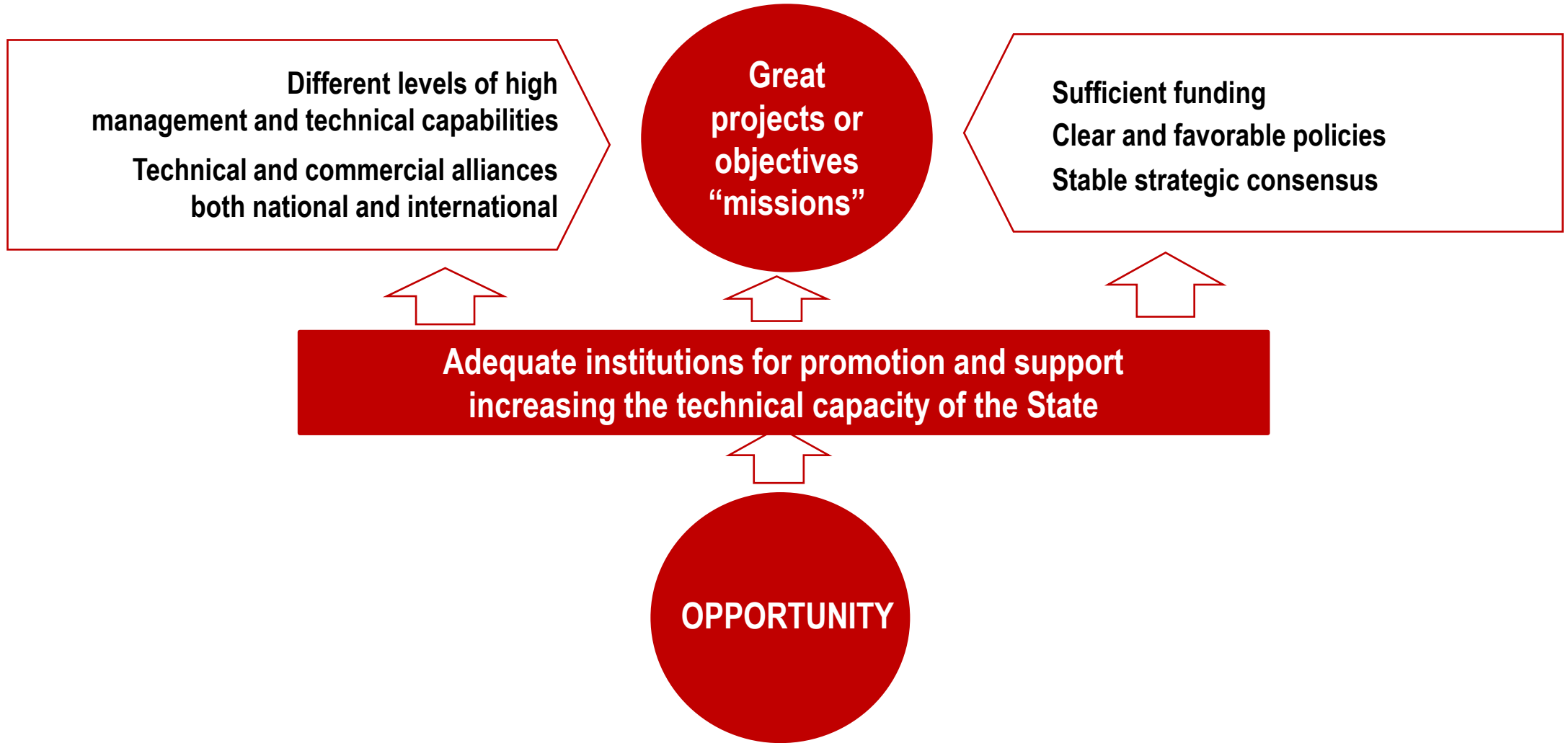
## A DEVELOPMENT STRATEGY TO MAKE THE LEAP IN TWO STAGES

Move ahead now with the current window of opportunity for those countries with technical capabilities, abundant natural resources and great biodiversity

Be prepared to make the leap with the next technological revolution, developing capabilities in innovative, companies, local and global networks in the sectors of the future  
[Biotechnology, nanotechnology, bioelectronics, personalized medicine, custom materials, etc.]

**That is what Asia did with the ICT revolution without planning it**

# STATE OR MARKETS? SUCCESSFUL NATIONAL PROJECTS FOLLOW A SIMILAR PATTERN



NEITHER THE STATE NOR THE MARKET ALONE, BUT BOTH AIMING AT A CONSENSUS GOAL



THANK YOU

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