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## **ICT Higher Education in Estonia**

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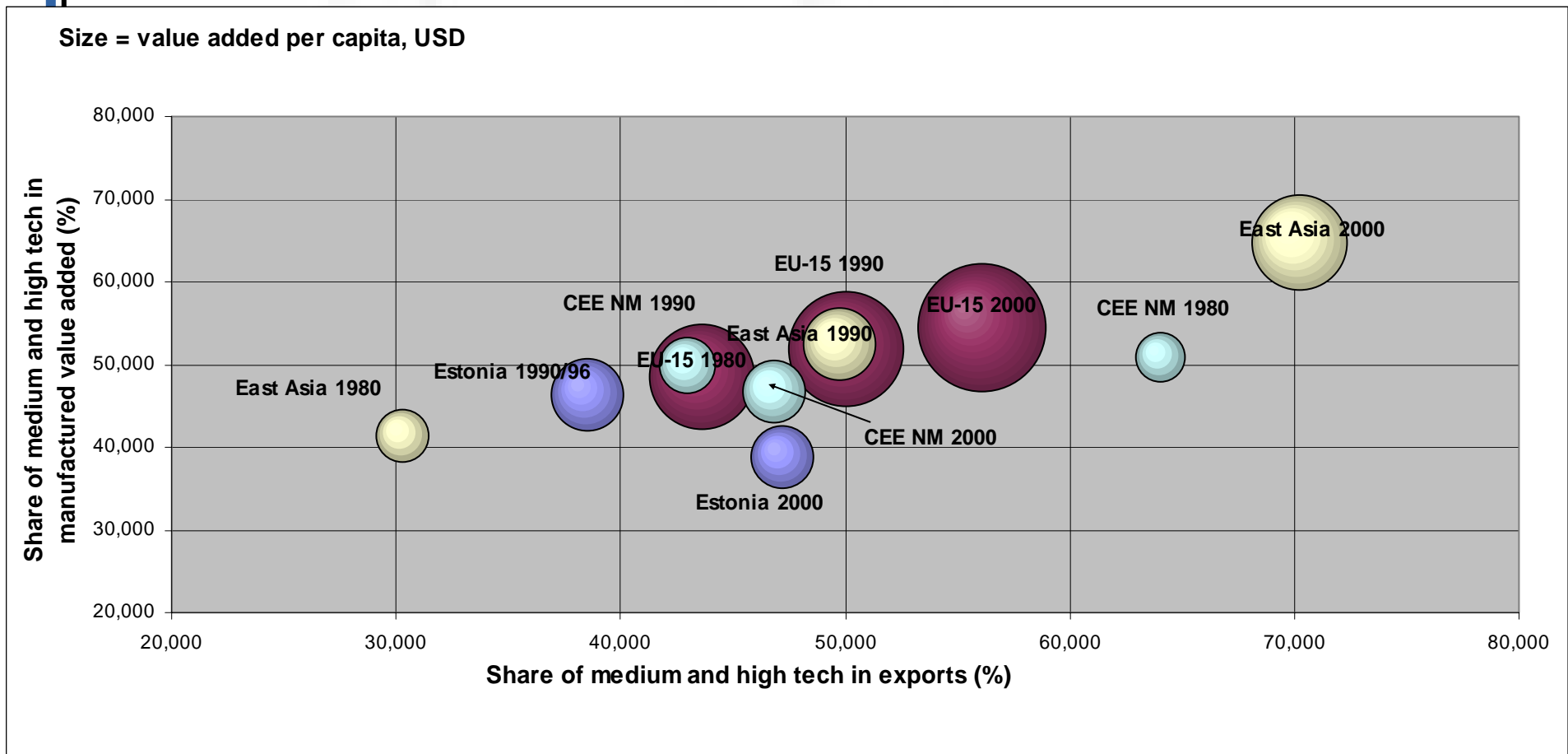
Seminar „Knowledge-based Economy and ICT Higher Education:  
Overview of Current Situation and Challenges for the Higher  
Educational System until 2008”

IT College, Tallinn, 27 November, 2004

## Challenges of ICT paradigm

- In terms of techno-economic paradigms, we **are at a turning point**: golden vs gilded age?
- It depends on how **public policies** handle challenges posed by the paradigm
- In terms of techno-economic paradigms, we are today in a **similar situation as in late 1930s**
- **First, the challenges**

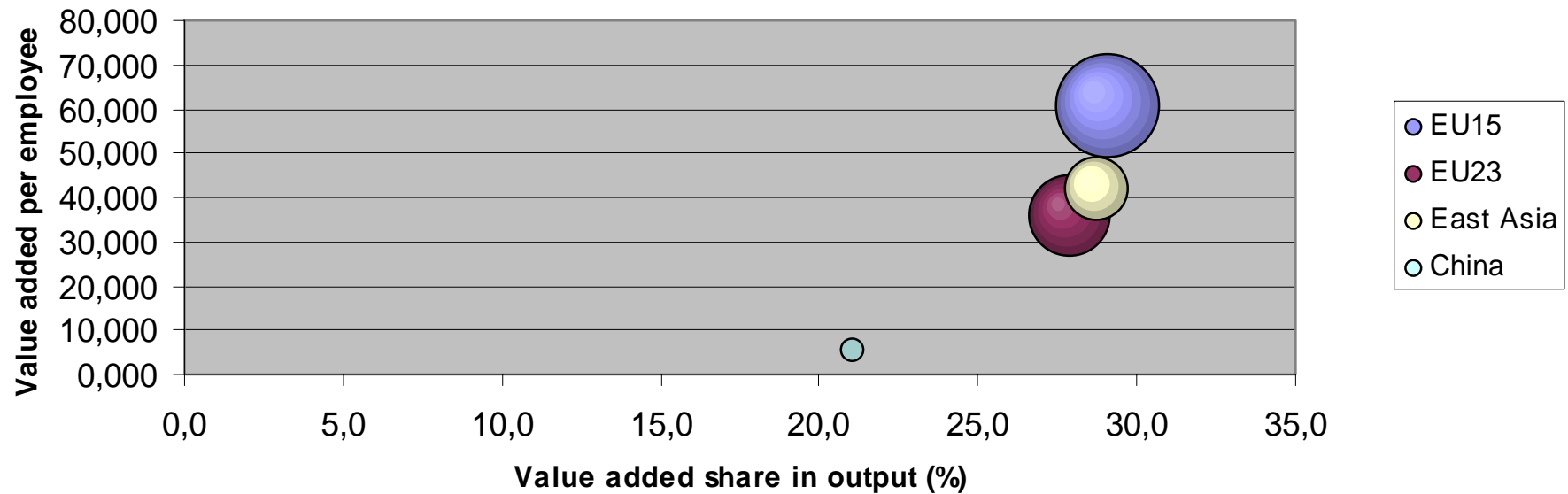
# Quality of Industrial Change, 1980-2000



Source: Reinert&Kattel 2004

# Wage and productivity competition: Europe vs Asia

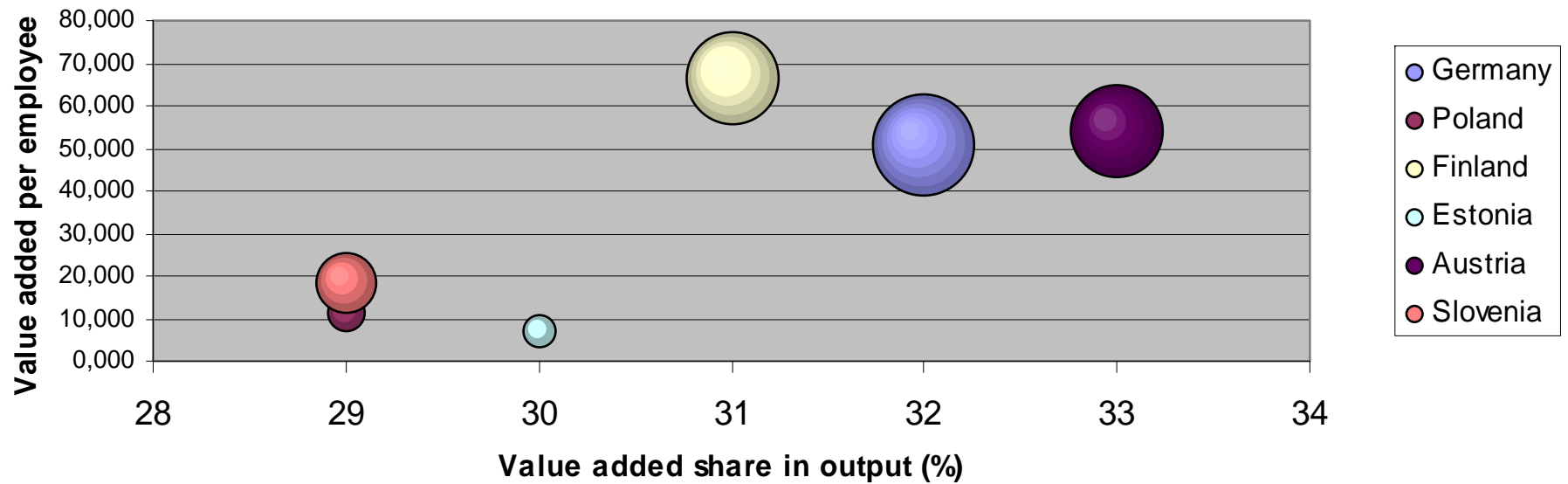
Bubble size indicates wages per employee



Source: Reinert&Kattel 2004

# Wage and productivity competition: Old Europe vs New Europe

Bubble size indicates wages per employee



Source: Reinert&Kattel 2004

# Challenges

- **ICT paradigm as globalization challenges**
  - Wage levels in both old and new Europe
    - The reason why CEE companies don't "innovate" nor do R&D
    - Dacia
  - Importance of geographical location as unit of economic development (uneven development within countries)
  - Entrepreneurs via heightened competition from abroad (dynamic, winner-takes-all markets)
  - Investment into R&D and education as the return might be global or unknown
- Notice how different risks and challenges are fundamentally different and enforce each other: upgrading difficult!
- We are at a point where economic development with relatively high social costs is very likely even in most developed states

## Solutions?

- **Solutions need to consider all risks as they are all essential to development; and only then will development become a tide that raises all boats – self-enforcing competitive advantages (similarly to welfare state and Bretton Woods agreements in 1950s)**
- **That means that policy solutions should be directed at insuring risks of entrepreneurs, employees and R&D&education system simultaneously, i.e. complex solutions**
- **On this will depend whether countries like Estonia are able to use windows of opportunities to catch-up**
- **These windows of opportunities are almost certainly in one or other way ICT-based**

## Windows of opportunities for Estonia?

- **Parts of medium tech value chains from Scandinavia**
  - Engineering and design
- **Biomedical technology and instruments**
- **Bioinformatics**
  - Genetic databases
- **Export of software developed for public sector**
  - Former USSR and CEE
- **Knowledge-intensive business services**
- **Logistics**
- ...
- ***Made in Estonia, coming soon***



## ICT in Estonia: private sector

- **Sector leaders seek to move higher in value chain**
  - main obstacle: lack of people
- **Small market for software and services**
  - Role of public sector
- **Little competence in hardware development**
  - Main obstacle: lack of people?

## ICT in Estonia: science

- Weak scientific quality and small base (80% of ISI publication by 10 scholars)
- Problematic PhD education

Institution	No of scientists	Total no of articles	References	Reference/ articles	Total for institution	Average per person
Cybernetica	13	11	10	0,9	21	1,6
IT College	13	5	1	0,2	6	0,5
TUT Institute of Cybernetics	27	143	268	1,9	411	15,2
TUT	91	149	168	1,1	317	3,5
TU	19	41	778	19,0	819	43,1
Total	163	349	1225			

## ICT in Estonia: higher education

- Graduates with relatively little experience in ICT business
- Very little experience in terms of business and marketing
- Not very strong basic ICT education nor any specific specialized skills
- Hardly any connection with engineering, design

## ICT in Estonia: how to solve problems?

- **We tried to look for solutions that:**
  - Socialize risks of entrepreneurs, employees and R&D system
  - Are long-term
  - Systematic, i.e based on regulation that would empower the stakeholders

## ICT in Estonia: solutions I

- **Private sector:**
  - Monitoring system of ICT and electronics sector
    - Business, education, public sector
    - Look for windows of opportunities
    - Annual reviews of problems and bottlenecks
    - Mandatory part of policy formulation and evaluation
    - Feeds into strategies, plans etc
- **Science:**
  - common rules of game (to raise standards)
  - International PhD schools (Russia, Baltics, NIS?)
  - International faculty (Russia, Baltics, NIS?)
  - Recruiting temporary faculty from companies

## ICT in Estonia: solutions II

- **R&D**

- Technology programs in interdisciplinary and practical fields

- Must include engineering and/or design
    - Must include one of the key areas (ICT, biotech, nanotech)
    - From curriculae to grants and loans to companies
    - E.g biomedical engineering
    - Input from monitoring

## ICT in Estonia: solutions III

- **Education:**
  - Industry placement
    - 25% from study time
    - public scholarships
    - mandatory to stay at the company
    - x% of salary back to scholarship fund
    - Governed by an organization where industry, employees and universities have equal say
  - Interdisciplinary curriculae (from marketing to biotech)
  - Input from monitoring



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**Thank you!**

**Questions and Comments?**

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