

# Present Status and Future Outlook of the Accelerator Industry in Europe

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**Instrumentation Technologies**



# Presentation Overview

- **Market size**
- **PAC, EPAC and IPAC industrial exhibition statistics**
- **Two European accelerator industry cases**
- **Categorization of products**
- **Benefits to research infrastructure suppliers**
- **Effects of the crisis**
- **Other observations**
- **Conclusions**

# About Us



- Founded 1998, Slovenia (EU)
- 54 people (8 Ph.D., 7 M.Sc., 14 engineers)
- First contract for the equipment of the whole bpm system at Synchrotron SOLEIL and DIAMOND Light Source signed in 2003

# Libera



Instrumentation  
Technologies

When your users demand stability.



Many instruments. Many people.  
Working together.

[www.i-tech.si](http://www.i-tech.si)

|   |   |   |   |   |  |
|---|---|---|---|---|--|
| <p>1 Libera<br/>Brilliance</p>  <p><i>Electronic beam position processor</i></p> | <p>2 Libera<br/>Photon</p>  <p><i>Photon beam position processor</i></p>                 | <p>3 Libera<br/>Clock Splitter</p>  <p><i>Clock and trigger signals distributor</i></p>                      | <p>4 Libera<br/>Busch-by-Busch</p>  <p><i>Digital processing unit for simulating coupled bunch instabilities</i></p>   | <p>5 Libera<br/>Busch-by-Busch Front End</p>  <p><i>RF signal processing for Libera Busch-by-Busch</i></p> | <p>6 Libera<br/>Hadron</p>  <p><i>Hadron beam position processor</i></p>  |
| <p>7 Libera<br/>LLRF</p>  <p><i>Digital RF substation system</i></p>             | <p>8 Libera<br/>Sync Transmitter</p>  <p><i>Low jitter clock distribution system</i></p> | <p>9 Libera<br/>Sync Receiver</p>  <p><i>Electronic beam position processor for single pass machines</i></p> | <p>10 Libera<br/>Brilliance Single Pass</p>  <p><i>Electronic beam position processor for single pass machines</i></p> | <p>11 Libera<br/>Spectra</p>  <p><i>Digital pulse processor for spectroscopy studies</i></p>               | <p>12 Libera<br/>Single Pass</p>  <p><i>Single bunch position processor for cavity and non-cavity RF pickup</i></p> |

*State-of-the-art instrumentation systems used at  
accelerators around the world.*



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IPAC  10

# Sources of Information

## ■ Publicly available information

- ERID Watch
- ESFRI
- Conferences and workshops
- Other

## ■ Questionnaire

## ■ Personal Communication

## ■ About statistical figures

- The statistical figures presented in this presentation must be interpreted within the context of this presentation
- However, the statistical data may provide some quantitative indicators to the qualitative issues discussed

# ERID Watch Overview

- **The EU Commission funded the FP6 program called ERID Watch**
  - Mutual improvements in the policy mix of the Member States
  - Enhance the efficiency of public investments in European RI
  - To develop public-private partnerships
- **51 existing Research Infrastructures and 8 ESFRI projects interviewed, covering all scientific domains**
- **30 institutional bodies interviewed, including regional and national authorities, also in new Member States**
- **175 companies interviewed, mostly Research Infrastructures' suppliers or/and R&D collaborators**

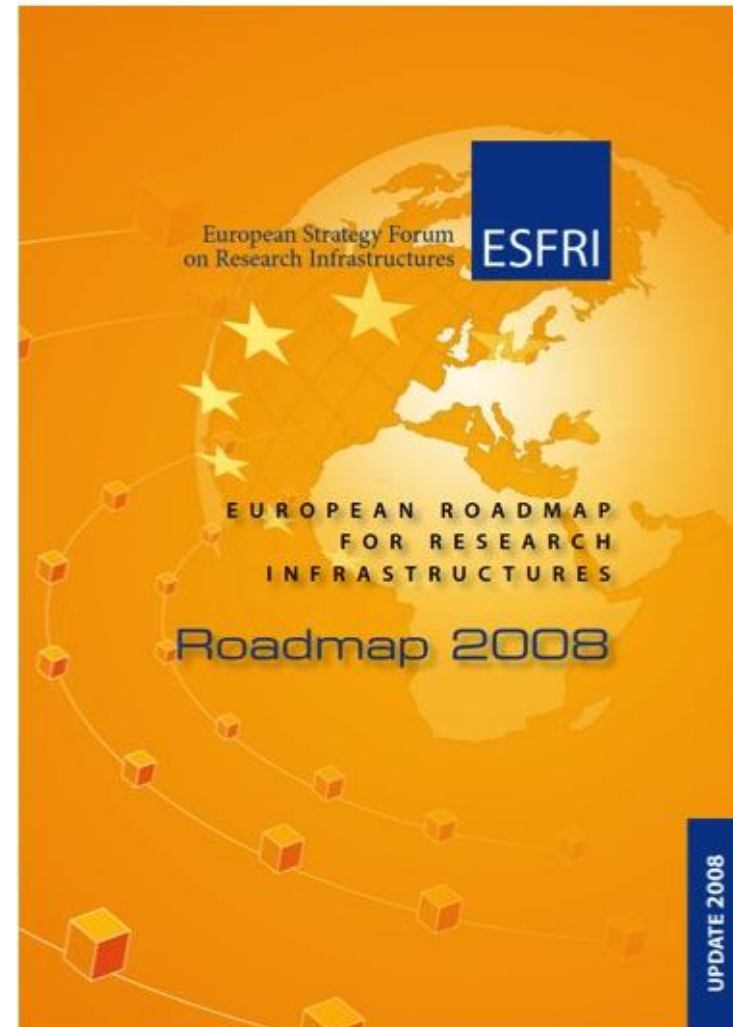


SIXTH FRAMEWORK PROGRAMME



# ESFRI Overview

- European Strategy Forum on Research Infrastructures
- The mission of ESFRI is to support a coherent and strategy-led approach to policy-making on new and existing pan-European and global research infrastructures.
- ESFRI Roadmap 2006: 35 projects
- ESFRI Roadmap 2008: 44 projects



# Market Size – ERID Watch Perspective

- The 300 medium size and large research infrastructures constitute a **8–9 billion €** market per year.
- Taking inflation into account, the annual budget for existing research infrastructures (excluding ESA) has shown an average increase of **5.5 percent per annum** over the past 10 years.



# Market Size – ERID Watch Perspective

Services: initial and ongoing services not directly connected to the experiments

Instrumentation (tools): instrumentation, experimental infrastructure and associated technical services

Other, 1%  
Services, 6%

Facilities, 16%

Instruments, 49%

Internal, 28%

Facilities: buildings, general utilities and other infrastructure not directly connected to the experiment

Internal: RI funding that is spent on staff and other elements not available to industry

# Market Size – ESFRI perspective

## 44 ESFRI projects to be built till 2020

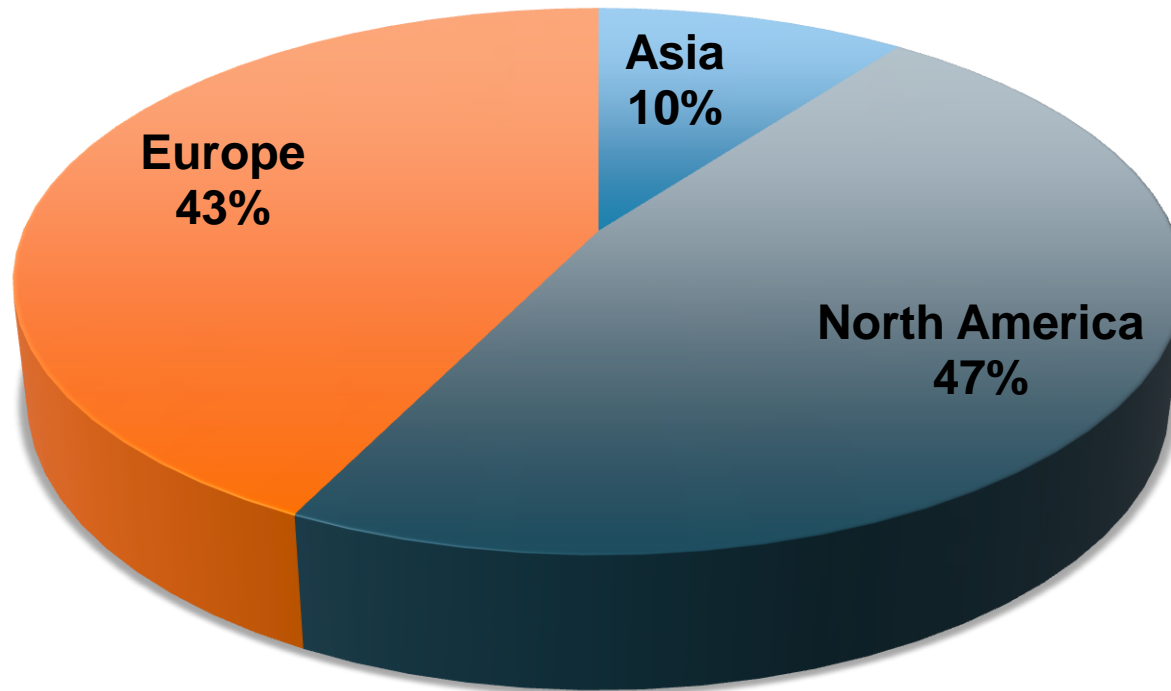
| Construction costs | Operations costs / year |
|--------------------|-------------------------|
| 18 billion €       | 2.2 billion €           |

## 10 “accelerator like” facilities

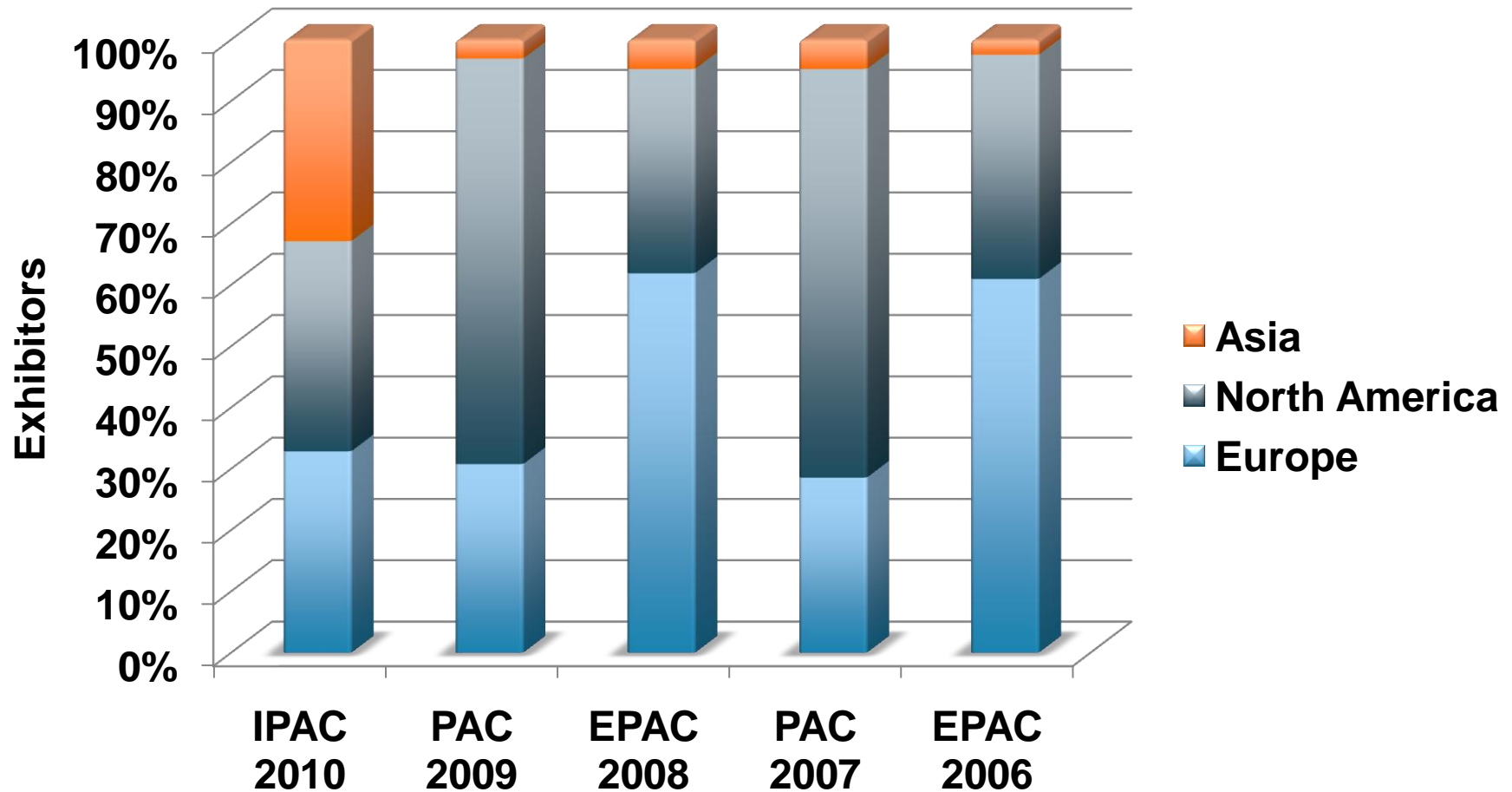
| Construction costs | Operations costs / year |
|--------------------|-------------------------|
| 8 billion €        | 750 million €           |
| 45 %               | 34 %                    |

# Industrial Exhibitors P.A. Conferences

**IPAC 2010 + PAC 2009 + EPAC 2008 + PAC 2007 + EPAC 2006**



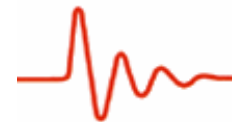
# Industrial Exhibitors PA Conferences



# The European Representation IPAC10



Rok Uršič



Werk für  
Industrie-  
elektronik  
Nuclear-  
elektronik  
Realtime

IPAC  10

# Two European Cases

## ■ Hadrontherapy

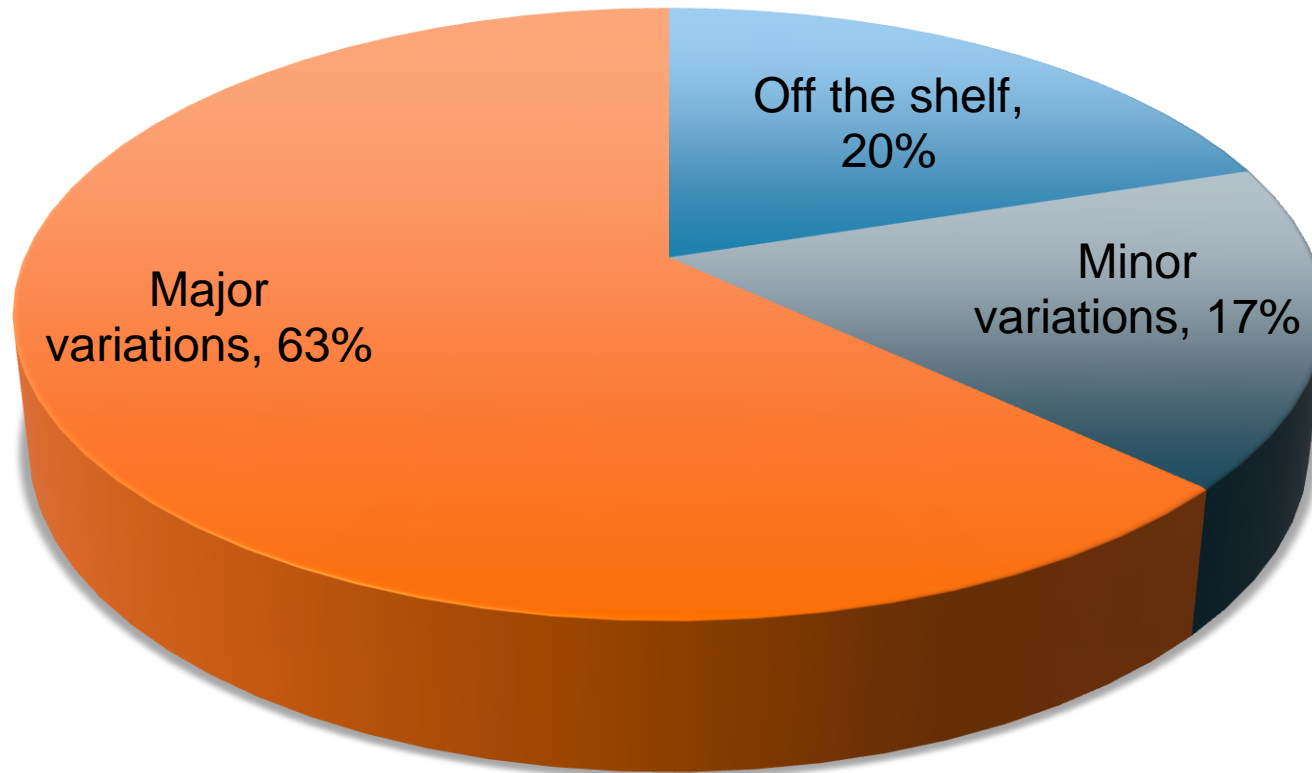
- IBA, Belgium
- Siemens, Germany (Danfysik, Denmark)
- Varian, USA (Accel, Germany -> Research Instruments, Germany)

## ■ Beam Instrumentation and Controls

- Bergoz Instrumentation, France
  - ✧ Faraday Cup Award
- CAEN, Italy
- Cosylab, Slovenia
- Instrumentation Technologies, Slovenia
  - ✧ Libera Workshop
- Micro Research, Finland

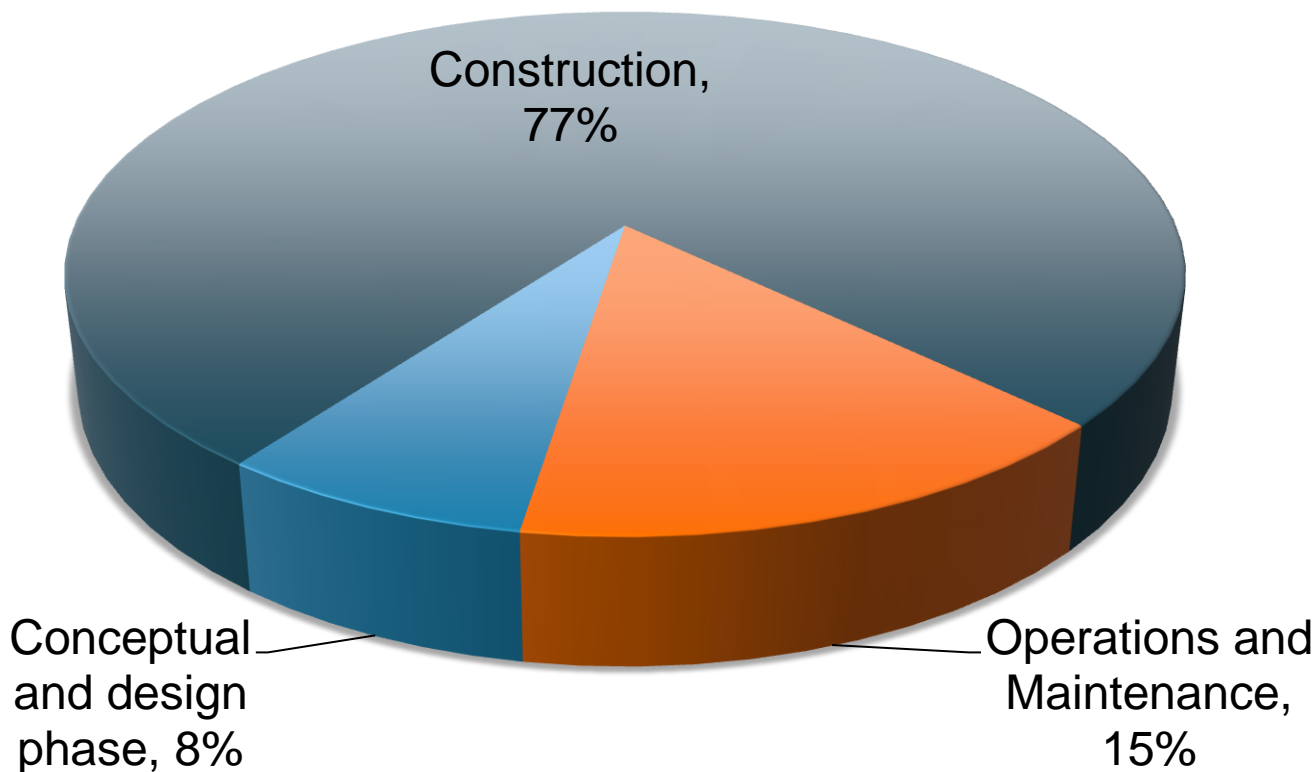


# Categorization of Products



# Opportunities for Industry

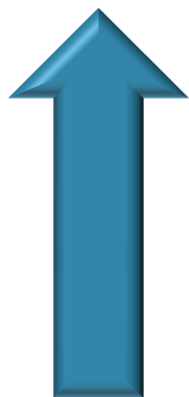
**In which phase of the accelerator life-cycle do you see most opportunities for industry involvement? (N=14)**



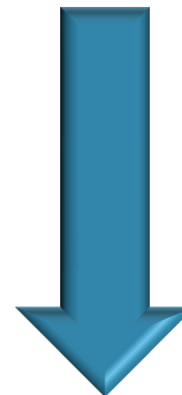
# Benefits to R.I. Suppliers

The RI instrumentation market is a highly demanding segment. It should therefore be possible to move into additional subsectors of the scientific instrumentation market.

Complexity  
of products



Move into  
additional markets



Medium sized  
and large  
research infrastructures

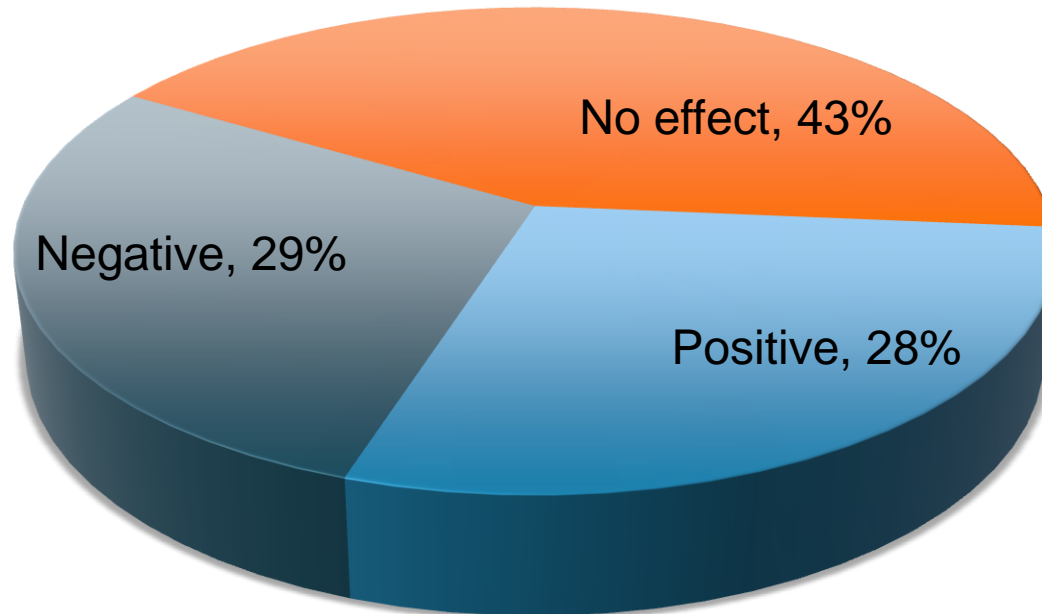
Construction cost > 20 million €

Smaller facilities,  
research institutes, etc.

Construction costs < 20 million €

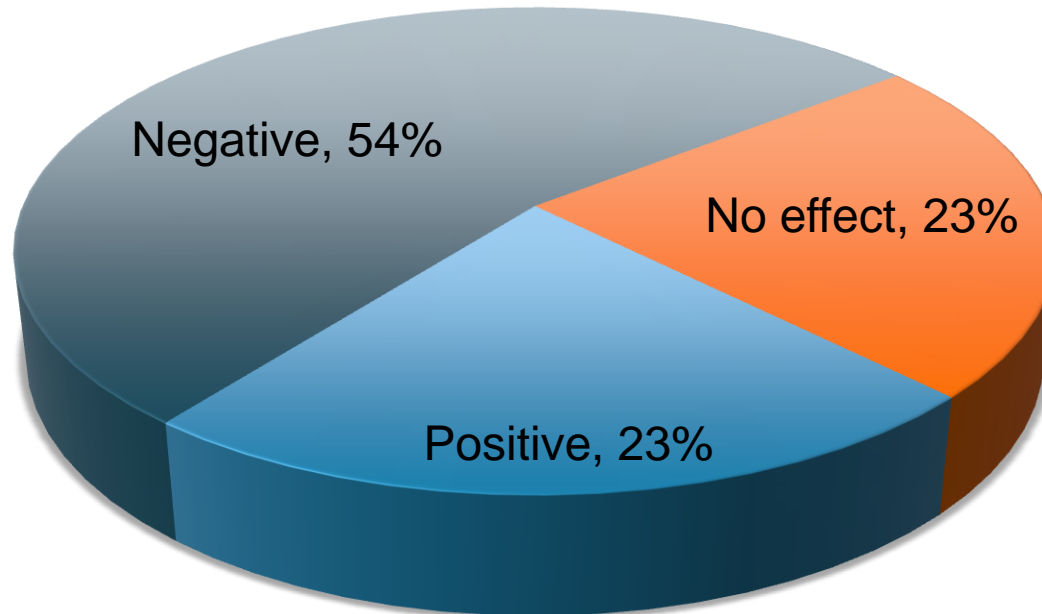
# Effects of the Crisis (1)

**What effect will current economic crisis have on the construction of new and upgrade of existing accelerators?  
(N=14)**



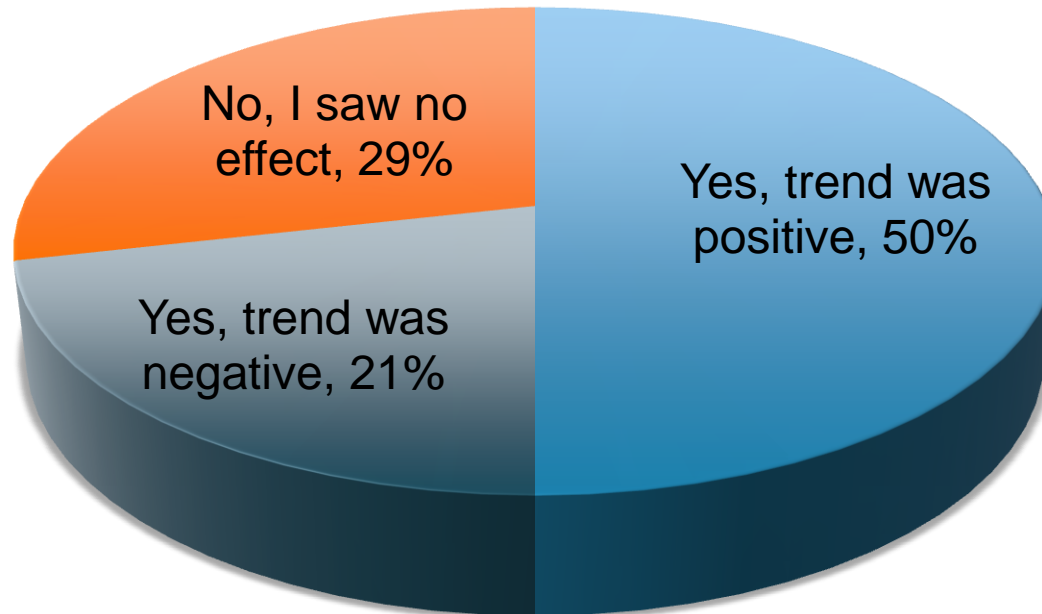
# Effects of the Crisis (2)

**What effect will current economic crisis have in general on the volume of business between accelerators and industry?  
(N=14)**



# Effects of the Crisis (3)

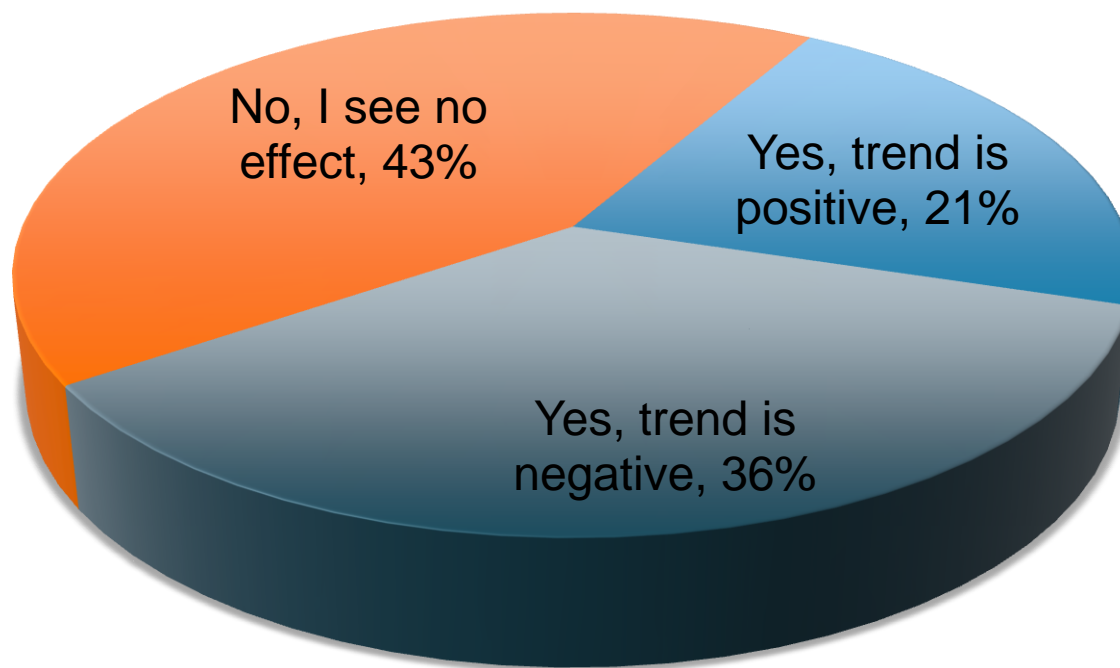
**Did you see changes in the trend of outsourcing from accelerator laboratories to your company before the crisis?  
(N=14)**





# Effects of the Crisis (4)

**Is economic crisis affecting volume of your business with laboratories? (N=14)**



# Other Observations (1)

## ■ Procurement activities first up then down

- In short term different flavors of national stimulus packages provided boost
- Mid term (3-5) years government fiscal problems are already and will negatively effect accelerator facility budgets

## ■ Expected mid term business volume drop

- Laboratories will find themselves with fixed cost for staff
- Will try to leverage their internal resources
- They will cut on the procurements

## ■ Long term it will come back again

- Economically more efficient
- Technology changes

# Other Observations (2)

## ■ Operation and maintenance are two overlooked business opportunities

- Already happening with medical accelerators
  - ✧ IBA example: “Platinum Operation and Maintenance Contract including Spare Parts”
- Not yet common on bigger European research facilities
  - ✧ Japan leading the way in this field

## ■ Collaborative R&D promising but difficult

- Customers are also potential competitors
- Scientists and engineers like to have fun building the machines
- Enormous administrative overhead

## ■ Is there space for new business models?

# Conclusions

- **Europe has dynamic and globally recognized industry players in the accelerator market**
- **Europe has some specific cases, two were presented**
  - Hadrontherapy
  - Beam instrumentation and controls
- **Current economic crisis already have and will continue to have an effect on the volume of the business between accelerators and industry**
- **There is a pan-European effort towards research infrastructure and collaboration with industry**
- **Delays in construction decisions deeply affect companies, either large or small**

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