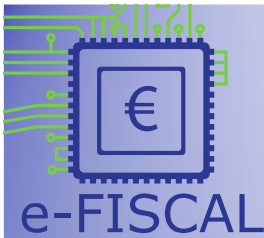


Impact of e-Infrastructures: Theories and  
practices of assessment methodologies  
29 March 2012

**e-FISCAL: Costs of HTC and HPC infrastructures  
- results up to present**

Fotis Karagiannis,  
Athens University of Economics and Business-Research Center  
AUER-RC

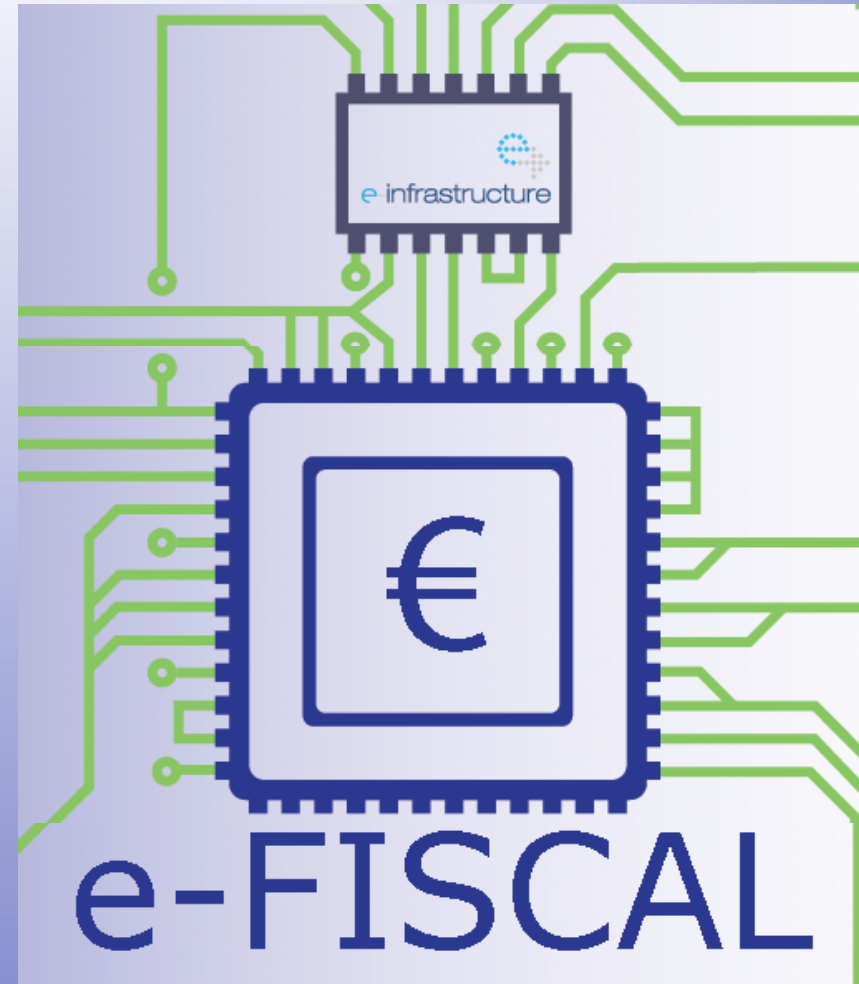


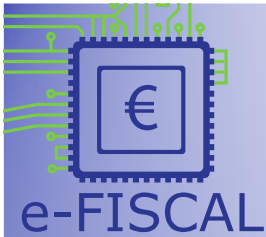
## Financial Study for Sustainable Computing e-Infrastructures

It's all about  
knowing the  
costs..

...their  
composition..

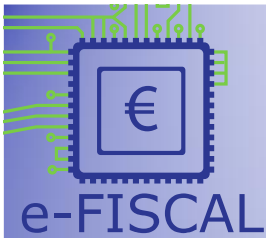
...and putting  
them in context!





# Main objectives

- **Analyse** the costs of the current European dedicated High Throughput and High Performance Computing (HTC/HPC) e-Infrastructures for research
- **Compare** them with the closest equivalent commercial leased or on-demand offerings
  - *Cloud computing!*
- **Evaluate** the findings through a report



# Consortium



AUEB-RC



EGI.eu

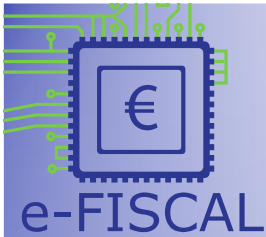


NUIG\*  
(ICHEC)



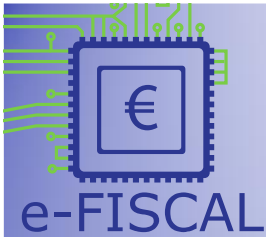
ETL

\* National University of Ireland, Galway / Irish Centre for High End Computing (ICHEC)



# Background

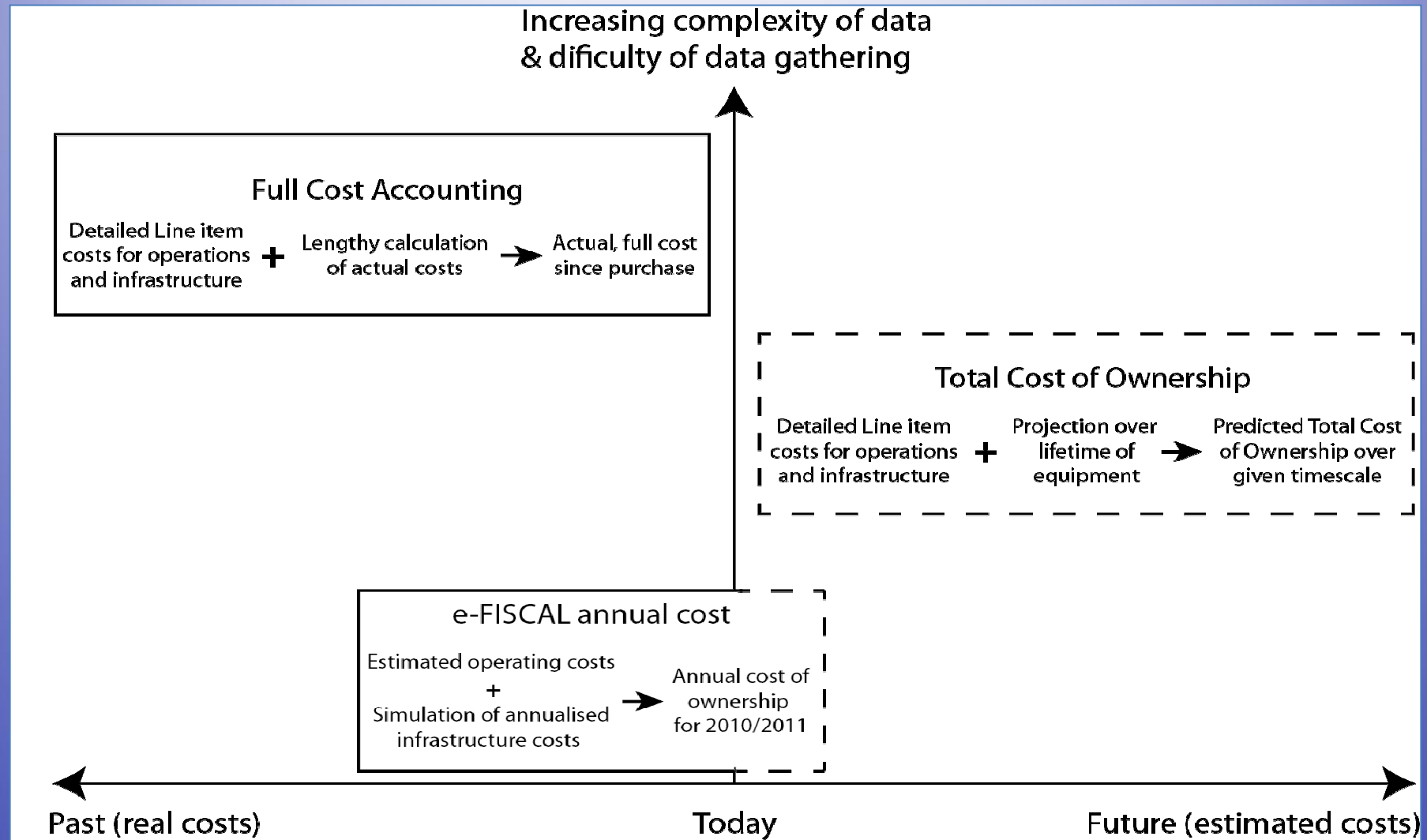
- First in-depth study in Europe
  - Significant sample of participants, HTC/HPC, comparisons with Clouds
- Builds on previous financial exercise
  - e-IRGSP2 project
  - Dealt with HTC (Grids) only, small number of NGIs involved -> initial charting of the area
- e-IRGSP2 highlighted the complexity
  - Findings available at [http://www.e-irg.eu/images/stories/e-irgsp2\\_d4\\_3\\_approved\\_by\\_the\\_consortium.pdf](http://www.e-irg.eu/images/stories/e-irgsp2_d4_3_approved_by_the_consortium.pdf) (look at deliverable second part)
  - Large range for overall cost estimate, **but** indicates EGI costs as competitive!



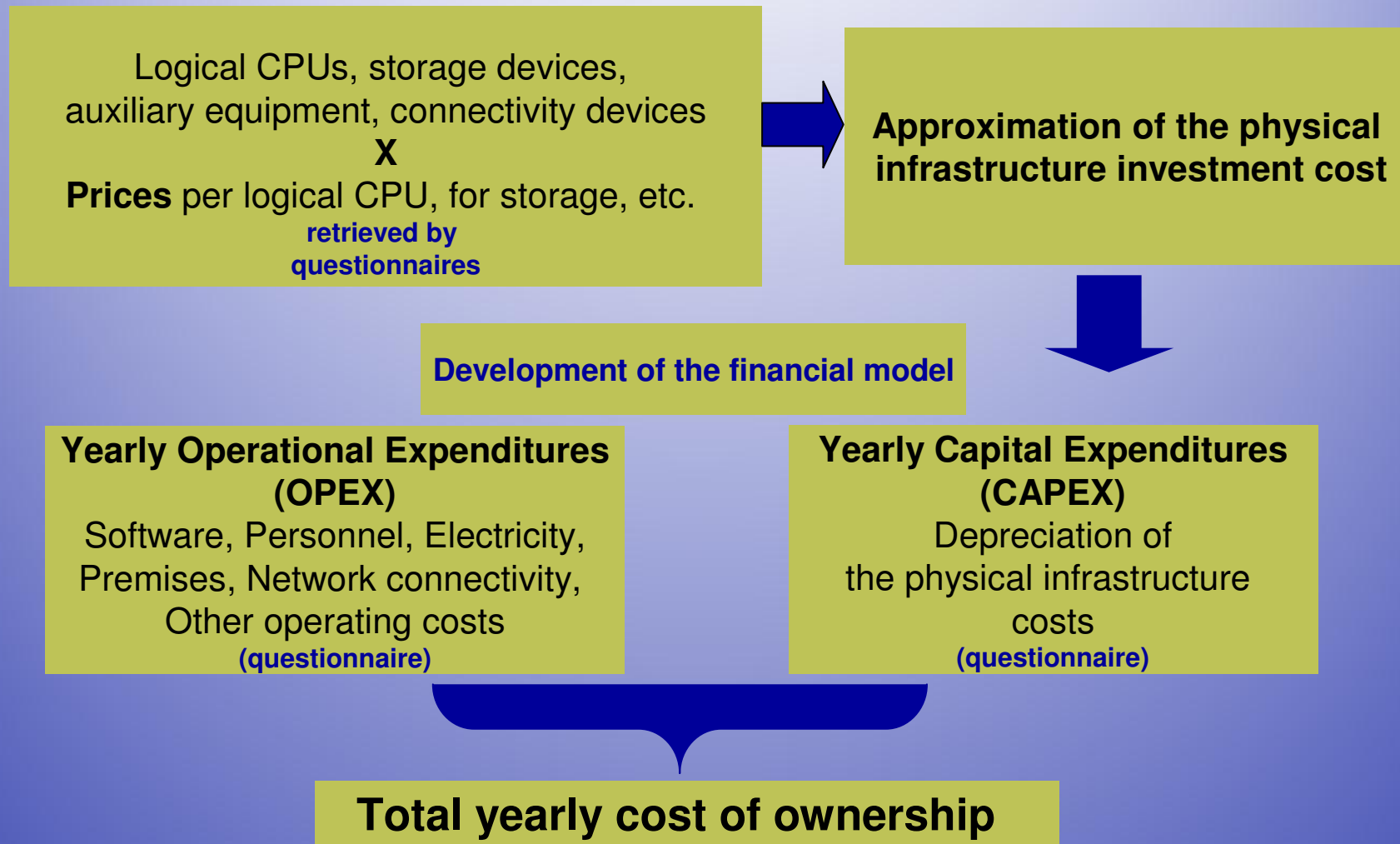
# Overall approach

- 2-phases
  - 1<sup>st</sup> phase: Basic questionnaire
  - 2<sup>nd</sup> phase: In-depth discussions
- Survey launch Dec 2011 ([www.efiscal.eu/survey](http://www.efiscal.eu/survey))
  - Survey closed – but please contact us!
- Feedback received from:
  - NGI/PRACE country coordinators
  - Other HPC/HTC site managers
- Sustainability discussions
  - e-FISCAL workshop, expert/update groups

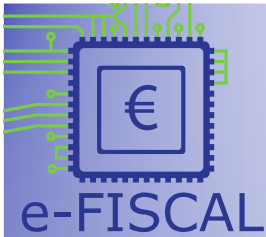
# Methodology



# Methodology

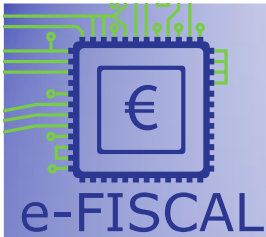






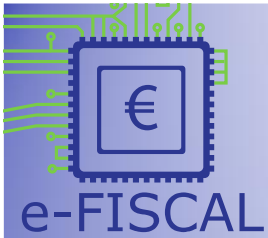
# Contributing to sustainability and impact assessment

- Special attention:
  - Performance benchmarking with commercial clouds
  - Can't compare prices with costs! (e.g. profit margin possible)
  - Confidentiality/Anonymity of data!
    - Cross-checks/validation with market or other prices
  - Inclusion of considerations beyond "plain" cost
    - Trust, reliability, customer satisfaction...
- Outputs:
  - Generic cost model
  - Cost per CPU core, Capex/Opex ratio, Personnel per CPU core...
- **Cost is different from value!**



# Confidentiality: more..

- Simple document prepared. Main points:
  - ***No identifiable data related to an individual site or national HPC/HTC entity will be presented***
    - all data will be summarised and appropriate metrics will be calculated only for groupings that are large enough to guarantee anonymity
    - Indicative metrics: cost per core hour, CAPEX/OPEX ratio, FTEs per core
    - Sample presentation available at [www.efiscal.eu/survey/data-presentation](http://www.efiscal.eu/survey/data-presentation)



# Cost per logical CPU/hour

Core = Logical CPU

	<i>Cost per Logical CPU/hour</i>	<i>% utilization</i>		
€/logical CPU hour		60%	80%	90%
Min	0,065		0,052	0,045
Max	0,152		0,135	0,100

SAMPLE

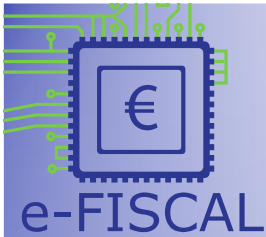
# Cost breakdown

<i>Overall cost breakdown</i>	
CPU depreciation	25%
Storage depreciation	14%
Interconnect equipment depr.	2%
Auxiliary equipment depr.	5%
Software costs	1%
Support contract costs	5%
Personnel costs	32%
Premises costs	8%
Electricity cost	7%
Connectivity costs	0%
Overhead costs	1%
<b>Total</b>	<b>100%</b>

SAMPLE

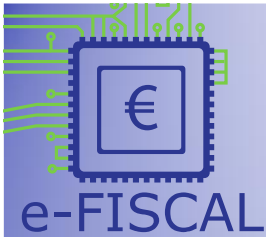
Capex =46%

Opex =54%



# Results up to present

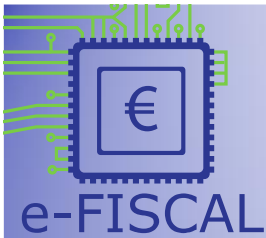
- State-of-the-art review
  - Reviewed 34 related papers available at <http://www.efiscal.eu/state-of-the-art>
- Benchmarking efforts underway
  - Comparison of EGI/PRACE infrastructures with Amazon
- Received 23 good quality surveys from 12 countries
  - Expecting some more ones requested extension
- Planning for the project summer workshop
  - 4 July 2012, Samos Island



# e-FISCAL Summer Workshop

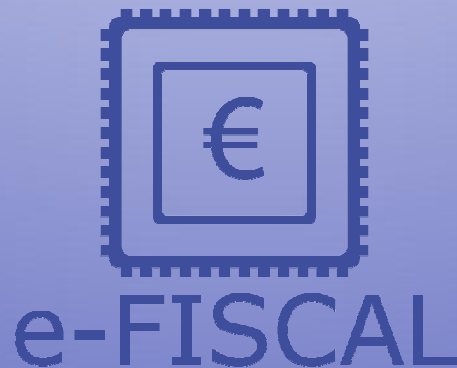
- 4 July 2012, Samos Island, Greece
- @ Samos Summit 2012 event series
- <http://samos-summit.blogspot.com>

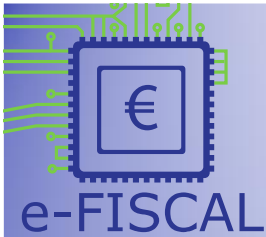




# Thanks!

- All material and questionnaire available in [www.efiscal.eu](http://www.efiscal.eu)
- e-mail us at [info @ efiscal.eu](mailto:info@efiscal.eu) to and keep up with the project (update list)
- Detailed workshop information to be sent out very soon!





# Project in a nutshell

- **Project acronym:** e-FISCAL
- **Contract n°:** RI-283449
- **Project type:** CSA-SA
- **Start date:** 01/08/2011
- **Duration:** 18 months (end 31/1/2013)
- **Total budget:** 392.523 €
- **Funding from the EC:** 349 999 €
- **Total funded effort in PMs:** 33.75
- **Web site:** [www.efiscal.eu](http://www.efiscal.eu)