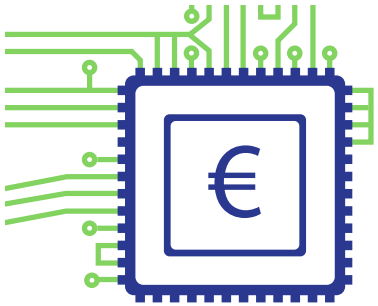

Reusable Tools and Approaches

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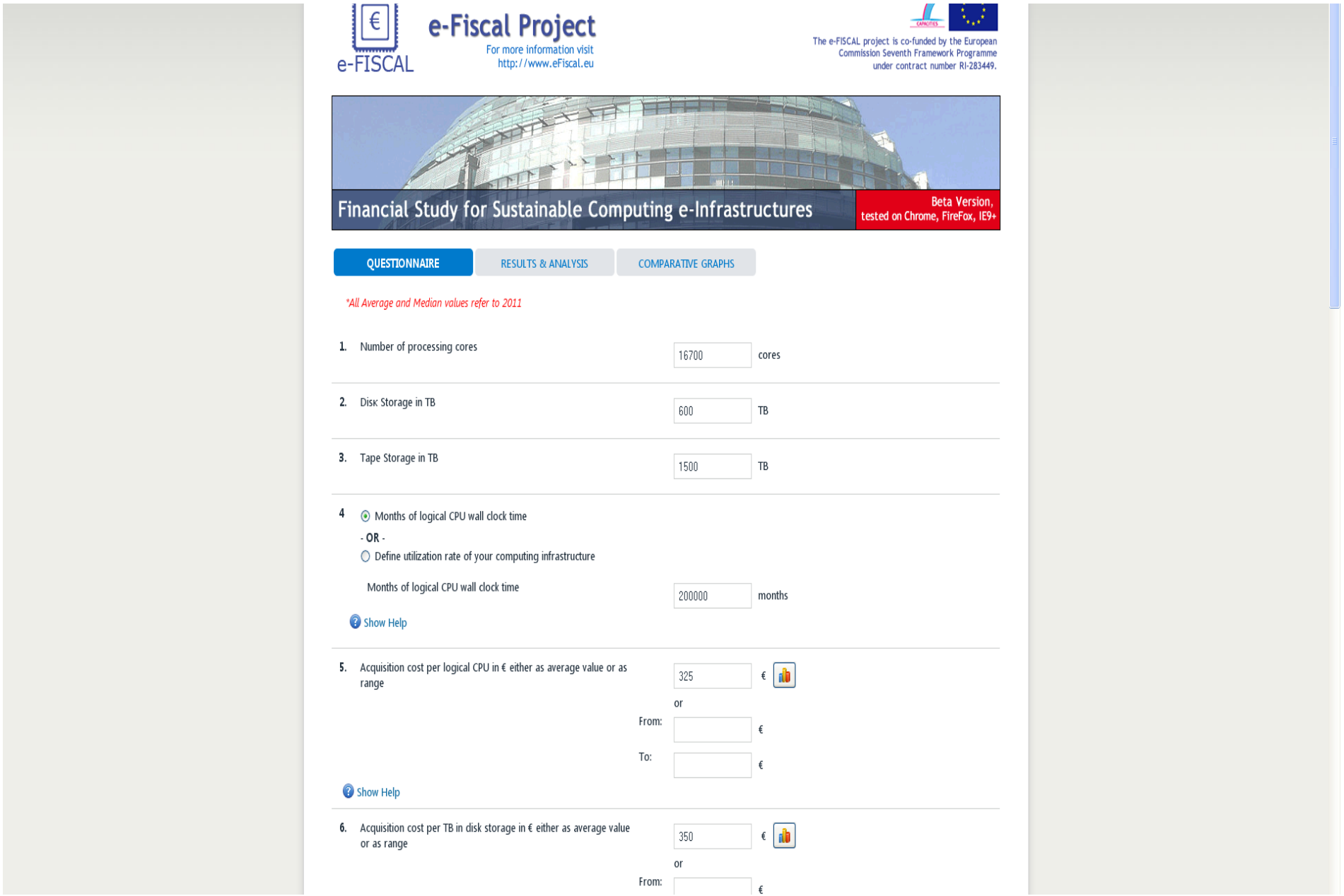
With acknowledgments to survey respondents, workshop participants, external experts and all the others who engaged with the project

Contents

- Tools
  - Excel, online cost calculation tool
  - Survey
- Approaches
  - e-FISCAL cost model
  - Benchmarking
- Best practices
  - State of the art
  - Linking financial and technical analysis

Cost calculation tools

- Beta versions available on project website
  - Online version and Excel-based on
  - Similar functionality and logic
- Uses
  - Original purpose: e-Infrastructure cost assessment
  - Apply to other federated environments
  - In-sourcing a (very) successful Cloud application?
- In-dept demo tomorrow (08.30 ->)
  - With coffee!!


e-FISCAL
e-Fiscal Project
For more information visit
http://www.eFiscal.eu
The e-FISCAL project is co-funded by the European Commission Seventh Framework Programme under contract number RI-283449.
Financial Study for Sustainable Computing e-Infrastructures
Beta Version, tested on Chrome, FireFox, IE9+
QUESTIONNAIRE
RESULTS & ANALYSIS
COMPARATIVE GRAPHS
*All Average and Median values refer to 2011
1. Number of processing cores
16700
cores
2. Disk Storage in TB
600
TB
3. Tape Storage in TB
1500
TB
4
Months of logical CPU wall clock time
- OR -
Define utilization rate of your computing infrastructure
Months of logical CPU wall clock time
200000
months
Show Help
5. Acquisition cost per logical CPU in € either as average value or as range
325
€
or
From:
€
To:
€
Show Help
6. Acquisition cost per TB in disk storage in € either as average value or as range
350
€
or
From:
€

e-FISCAL

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Financial Study for Sustainable Computing e-Infrastructures

Beta Version, tested on Chrome, FireFox, IE9+

QUESTIONNAIRE | **RESULTS & ANALYSIS** | COMPARATIVE GRAPHS

**All Average and Median values refer to 2011*

Totals

Show Calculations

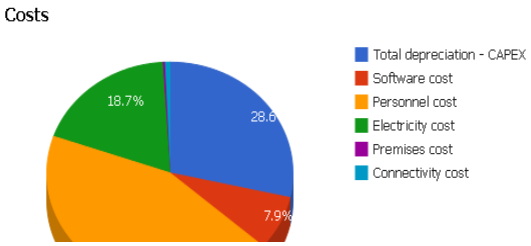
CAPEX	2,011,593.75 €
OPEX	5,027,375.00 €
CAPEX + OPEX	7,038,968.75 €
Utilization rate	98.43 %
Cost per Core/Hour	0.0489 €
Cost per Core/Year	421.50 €

Ratios

FTEs/1000s cores	1.80
m2/1000s cores	11.98
kwh/core per year	786.83
Power Usage Effectiveness	1.59
OPEX/Total	71.42 %
CAPEX/Total	28.58 %

Final Costs

Total depreciation - CAPEX	28.58 %
Software cost	7.86 %
Personnel cost	43.90 %
Electricity cost	18.67 %
Premises	0.28 %
Connectivity cost	0.71 %
Other cost	0.00 %



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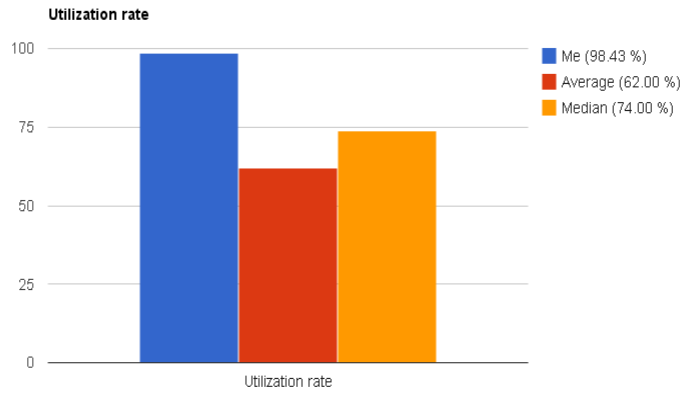
QUESTIONNAIRE | RESULTS & ANALYSIS | COMPARATIVE GRAPHS

*All Average and Median values refer to 2011

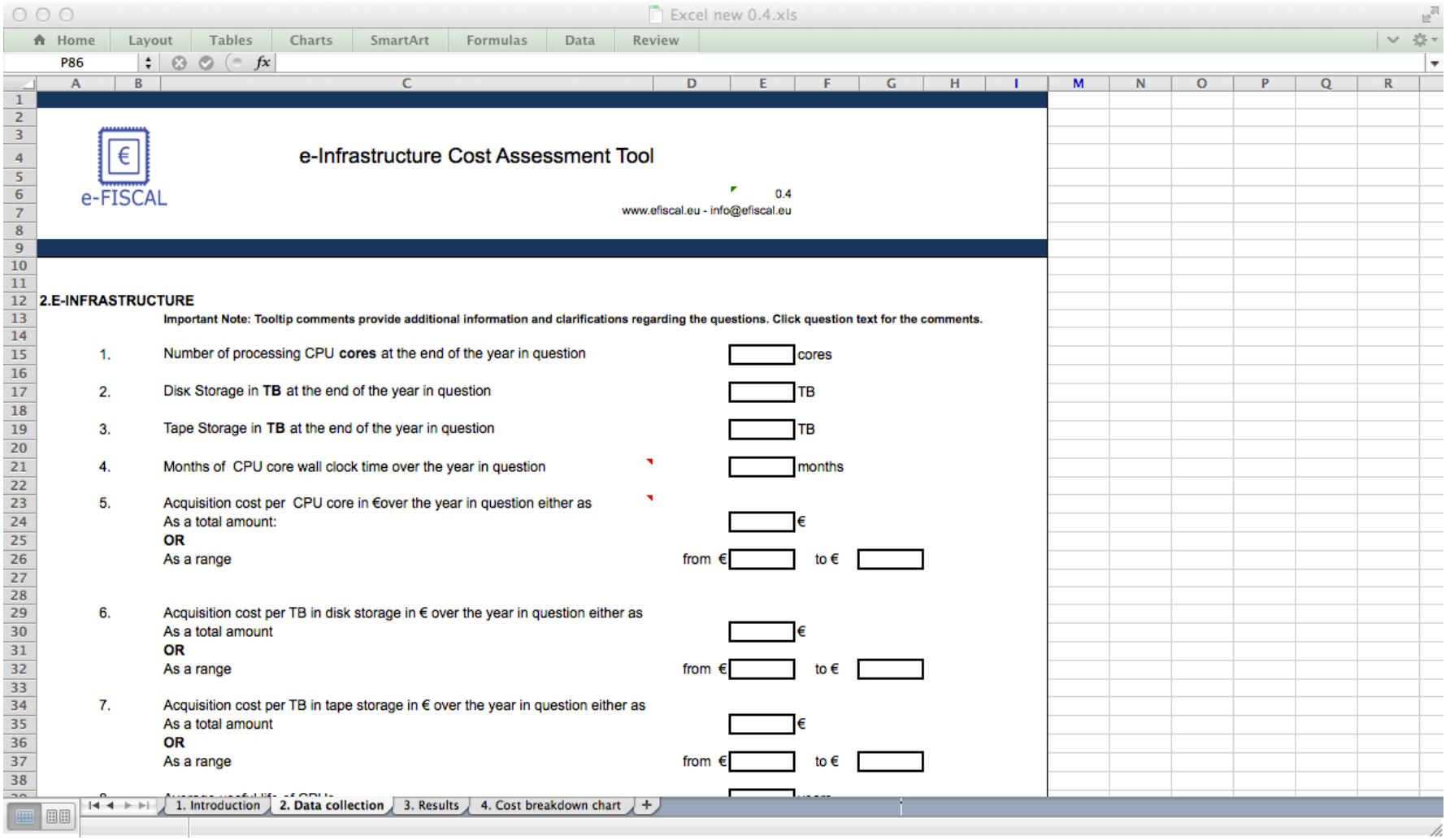
Expand All

- Utilization rate



- Cost per Core/Hour
- Cost per Core/Year
- kwh/core per year
- Power Usage Effectiveness
- OPEX/Total

Excel version



Survey

- Questionnaires available
  - Initial, detailed one (basis of the online/excel tools)
    - http://www.efiscal.eu/survey_first
  - Concise version used to complement initial data
    - http://www.efiscal.eu/survey
- Result of intensive multi-party scrutiny
  - Trade-off: ease of use vs. level of detail vs. motivating respondents
  - Consistent terminology
- Some of the work already picked up
  - EGI compendium effort

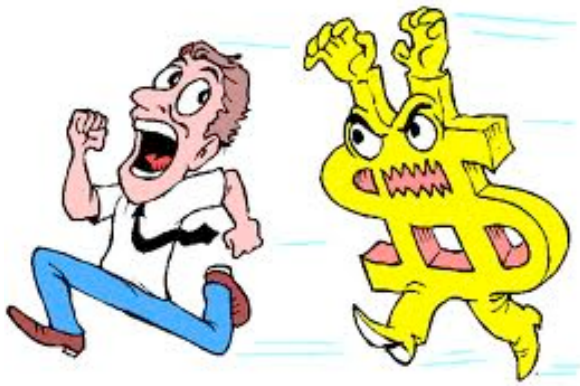
Approaches – cost model

- Hybrid model that builds on Full Cost Accounting (FCA) and Total Cost of Ownership (TCO) approaches
  - adapts to constrains
- Identify information that is readily available to intended respondents
  - Collect data through “FCA-like” questions
  - For others, derive the cost information using “TCO-like” questions
- For more details, see this morning’s tutorial presentation!
  - Link to presentations at http://www.efiscal.eu/final-workshop

Approaches – benchmarking

- Small-scale effort
  - Goal: establish a **range**, not a single number
  - Minimal resource use
  - Verify common model of the system (technical/financial)
- Used in sensitivity analysis of the financial results
  - More realistic multipliers for the results
- "Run a benchmark" sounds simple, but…
  - Establishing different test environment,
  - Ensuring they are comparable and
  - Interpreting the results are complex issues
  - ➢ **Generate tacit knowledge**

Cost



- 720 hours @ 99.29 USD ☺
  - ~100 % utilisation
  - Compute cluster instance @ $1.300 per Hour
  - Small instance @ $0.080 per Hour
- **Other useful facts:**
  - **On-Demand instances**
  - **Overheads (performance, I/O, setup)**
  - **Data transfer costs and time**

Best practices – state of the art

- Made into public resource
  - Non-trivial amount of extra effort, but support cross-disciplinary work
  - Make project relevant before there are results to publish
- Support community building
  - Engage with authors
- Will remain online after project ends
  - Long-term curation?

State of the art

For more information about relevant works

46 entries

- Multi scope orientation:
  - Costing issues in general
  - Business Models
  - Cloud vs. Grid papers
  - Migration to the Cloud papers
  - Industry benchmarks

Home

State of the Art

This table provides a list of papers relevant to the e-FISCAL work, which have been reviewed as part of the project state-of-the-art analysis. The papers mainly deal with financial aspects of High Throughput, High Performance, or Cloud Computing or other aspects related to the project such as Energy and Green IT.

If you are aware of a paper that is relevant and not listed below, please send us a note using the contact fo
The e-FISCAL summer workshop (July 3rd - 4th 2012) will also offer a chance to discuss state of the art.

:: e-FISCAL at the e-IRG workshop (Copenhagen June 11-12)

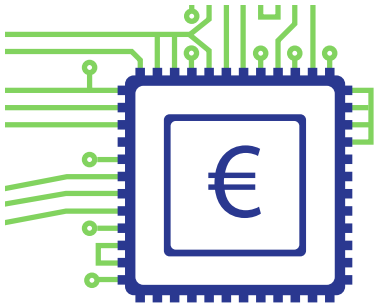
- Academic papers,
- Industry project results,
- EU studies' results,
- Engagement with experts
- **No** promotional material

28/1/2013 Paper	Methodologies and Their Uses Summary

:: e-FISCAL computing cost survey - deadline extended to 29th February

Best practices – transdisciplinarity

- The project relied to a large degree on equal participation, responsibility and activity of people from wide variety of domains
  - Avoided pitfalls of purely technology-, policy- or finance-led approaches
  - Broad contact interface
  - Awareness about different processes, approaches and constraints – within the project and outside



Thank you for your attention!

Questions??

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