Final Conference, Prague, May 30-31, 2011.

Robustness of Structures

COST Action TU0601

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What do I want to address

- Where did we start?
- Which were the objectives?
- What was the idea?
- How did we organize the project?
- What did we achieve?
- Where are we now?
- Where should we go?

Our Starting Point

- Attack on the WTC, September 11, 2001
- Discussions concerning roustness of structures intensified in the academic environment.
- Several projects were initiated worldwide on structural robustness.
- Joint Workshop JCSS – IABSE, November 2005.
- Decision to take up Robustness of Structures with renewed energy within the JCSS.

Our Starting Point

- Decision to formulate a proposal and apply for a COST project within the Transport and Urban development domain.

- Proposal was approved and the COST Action TU0601 started with a first meeting in Brussels on April 10, 2007.

Our Starting Point

- Since then we have had a total of 9 meetings including this one.

- October 8-9, 2007 - 1st MC meeting, London
- February 4-5, 2008 - 1st Workshop, 2nd MC meeting and 1st WG meetings, Zurich
- September 29-30, 2008 - 3rd MC meeting and 2nd WG meetings, Timisoara
- March 2-3, 2009 - 4th MC meeting and 3rd WG meetings, Coimbra
- September 21-22, 2009 - 5th MC meeting, 4th WG meetings and Joint Workshop with COST Action E55, Ljubljana
- April 19-20, 2010 - 6th MC meeting and 5th WG meetings, Denizli
- June 24, 2010 - 7th MC meeting and 5th WG meetings, Brussels
- October 4-5, 2010 - 8th MC meeting and 6th WG meetings, Copenhagen
- May 30-31, 2011 - Final Conference and final MC meeting, Prague

Which were the Objectives?

Main objectives:

To provide the basic framework, methods and strategies necessary to ensure that the level of robustness of structural systems is adequate and sufficient in relation to their;

- function and exposure over their life time

- societal preferences in regard to safety of personnel and safeguarding of environment and economy.

Which were the Objectives?

Sub-objectives:

- Consensus in the engineering profession on how to treat robustness
- Pre-normative probabilistic model code on robustness of structures.
- Guideline for practicing engineers on structural robustness.
- Disseminate knowledge on robustness of structures.
- Training of students, young researchers and practicing engineers.
- Reducing risks in the built environment.

Which were the Objectives?

Benefits for the engineering research community:

- Common perspectives and consensus on the difficult and controversial issues of structural robustness.
- Substantial improvement and further help in focusing research and developments of the future in the directions of the greatest needs.
- The COST Action will attain the role of being a platform from which further joint European and international research project will emerge.

Which were the Objectives?

Educational benefits:

- Several short term research missions will be conducted throughout the duration of the present COST Action.

- Summer school on robustness of engineering structures for students as well as young and experienced researchers.

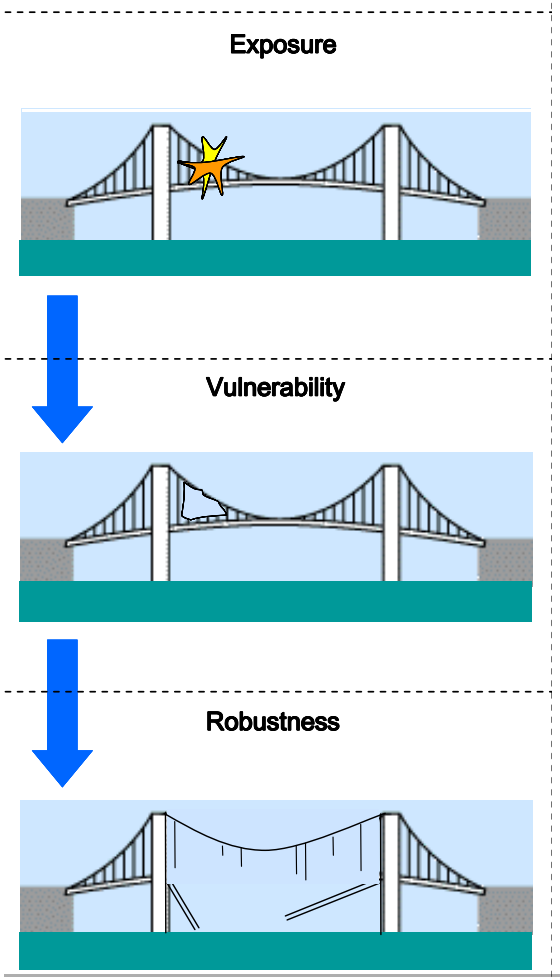
What was the Idea?

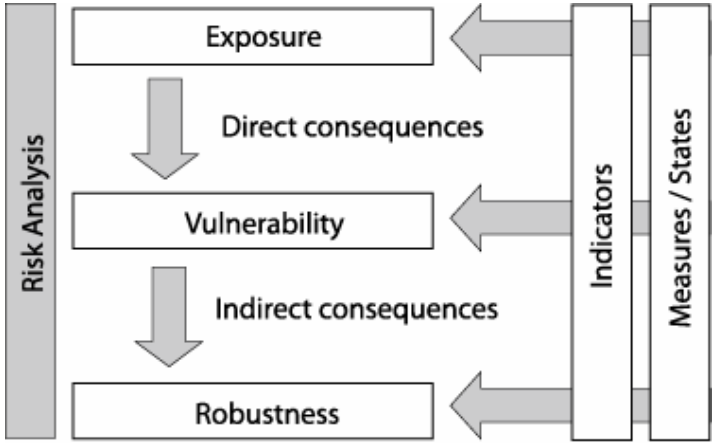
A new risk based perspective was taken to the problem complex:

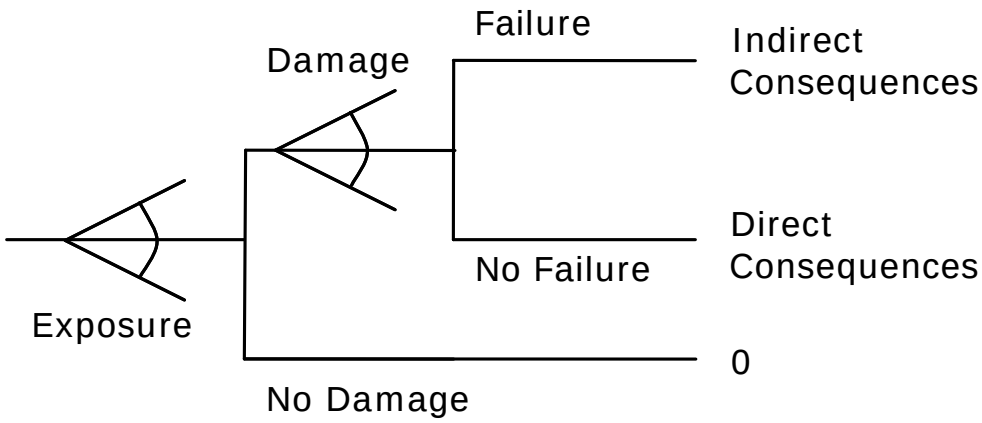
- What is robustness of an engineered system; how is it defined?
- Which are the indicators of structural robustness?
- How may robustness be represented in engineering models?
- How may robustness be assessed or even quantified?
- How can robustness be ensured in the design of structures?
- How can robustness be improved in existing structures?
- How may robustness be controlled and maintained over the life cycle of structures?
- How to assess criteria for acceptable robustness?

What was the Idea?

A scenario based risk assessment framework is utilized



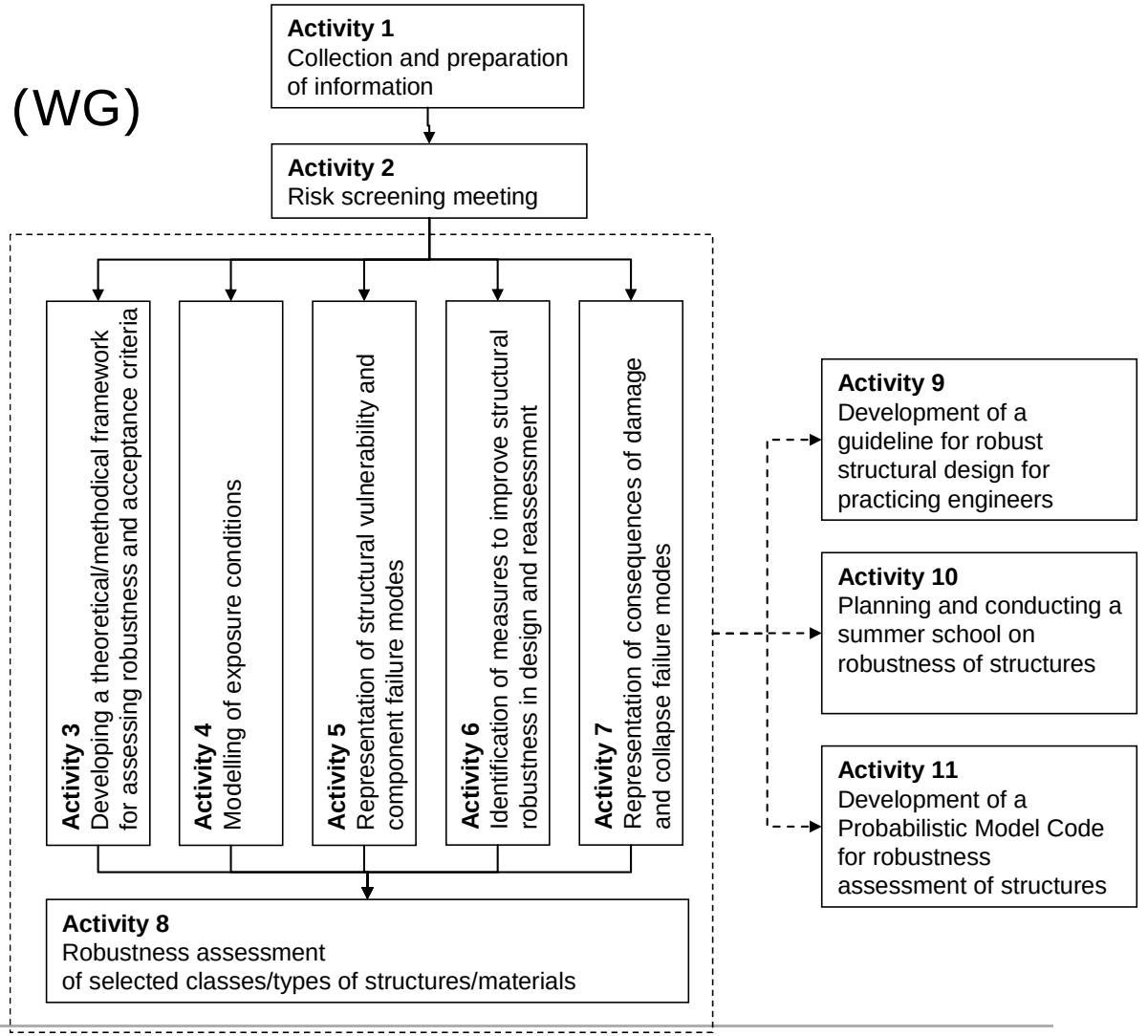




How did we organize the project?

- 3 working groups (WG)
- 11 activities (A)
- 1 task group (TG)
- joint meetings with C26

WG1 (A3)
WG2 (A4,A5)
WG3 (A6,A7,A8)
TG (A9,A10,A11)



How did we organize the project?

Four level management

- Management Committee
  - general management
- Steering Group
  - daily planning, execution and documentation of activities – coordination with C 26, E 55 and other projects
- Task Group
  - dissemination activities (A9-A11)
- Working Groups
  - WG1
  - WG2
  - WG3

How did we organize the project?

- WG1: Theoretical and methodological framework:
  Prof. John Dalsgaard Sorensen (Denmark)

- WG2: Modelling of exposures and vulnerability
  Prof. Ton Vrouwenvelder (Netherlands)

- WG3: Robustness assessment, implementation
  Prof. Marios Chryssanthopoulos (UK)

- TG: Dissemination actions
  Prof. Fabio Casciati (Italy)

What did we Achieve?

- Homogenization of perspectives and viewpoints on robustness of structures between experts representing 23 European states.
- Established a number of important contacts across academia and industry.
- Conducted and supported 7 Short Term Scientific Missions.
- Established collaboration with the domain Forests, their Products and Services (E55). Cross-domain synergetic effects.
- Published and presented:
  - 56 papers in the proceedings of workshops and conferences within the action.
  - A document on the theoretical framework on structural robustness - basis to develop a probabilistic model code on design for robustness of structures.
  - A document on robust structural design aimed at practicing engineers.
  - Educational material from a training school on robustness of structures for students, researchers and practicing engineers.
- Organized sessions and presented papers at 3 international conferences.

Where are we Now?

- The Action TU0601 Robustness of structures has come to an end….
- A framework for robustness assessments has been established and many of the building blocks have been established
- Many insights on robustness has been gained and exchanged
- New directions of research on robustness of structures have been formulated
- Collaborations have been undertaken and “tested”
- Networks – basis for future collaborative projects have been built

Where should we go?

- A number of general as well as more specific issues have been identified –

  Food for thought ☺

  - How robust is robust enough?

  - How to assess structural performance efficiently beyond the linear domain?

  - How to improve codes for design and assessment with respect to enhancing robustness of structures in practice?

Were we Successful?

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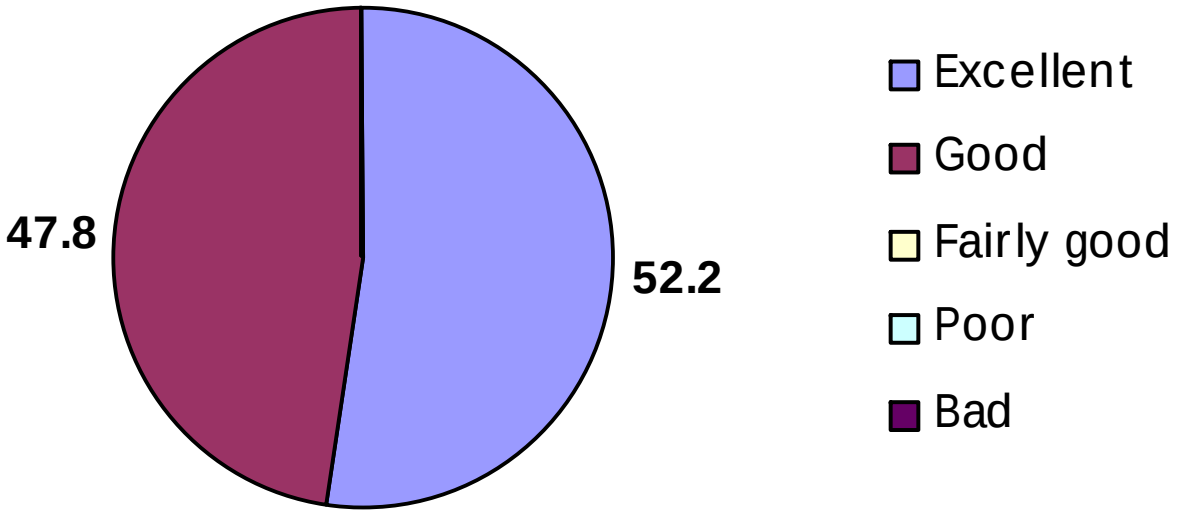
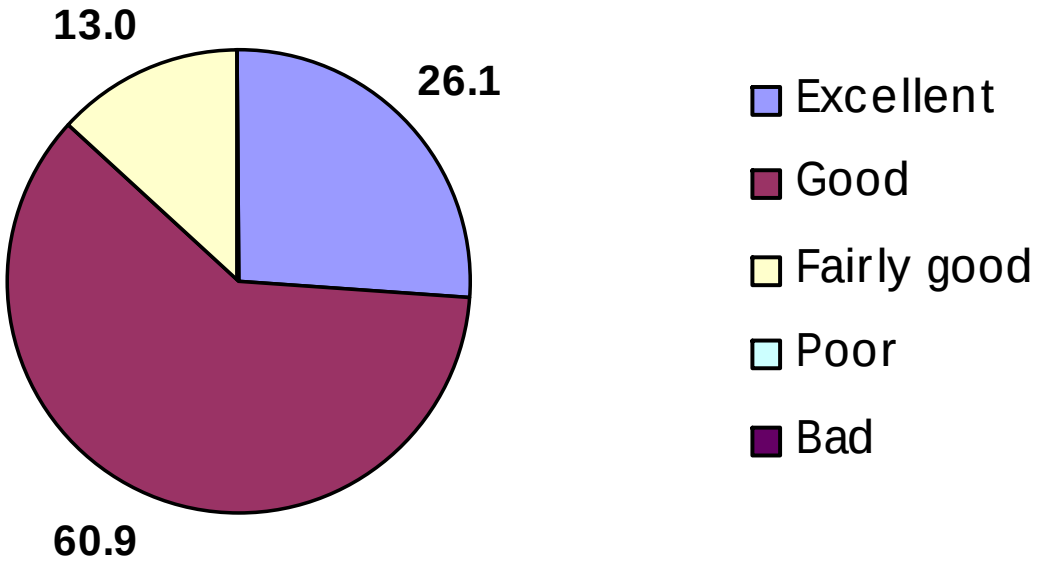
1. RESULTS VERSUS OBJECTIVES

Results versus general objectives

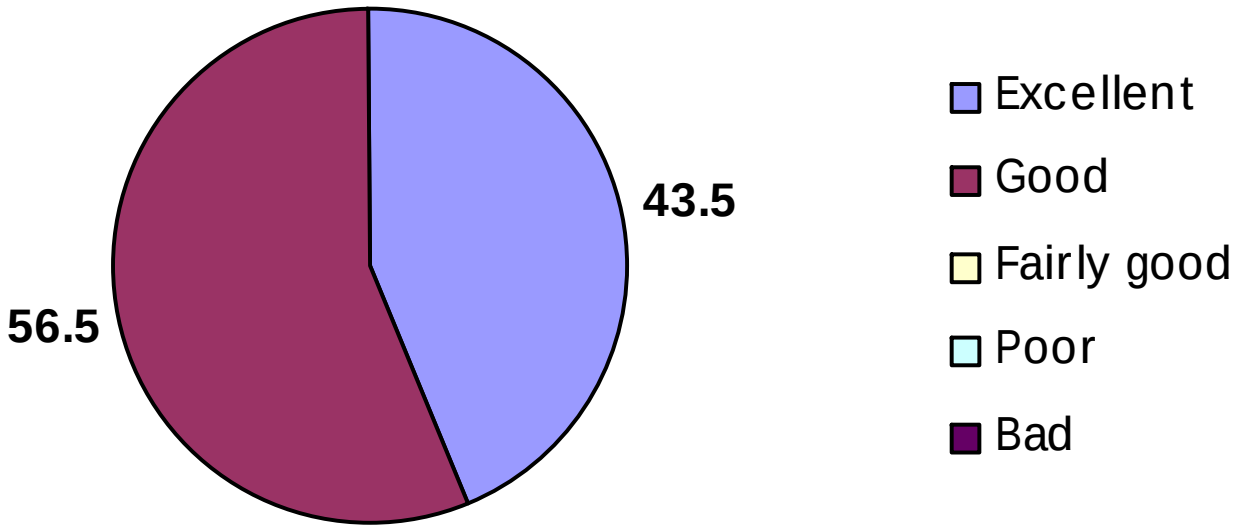


1. RESULTS VERSUS OBJECTIVES

Results versus specific objectives

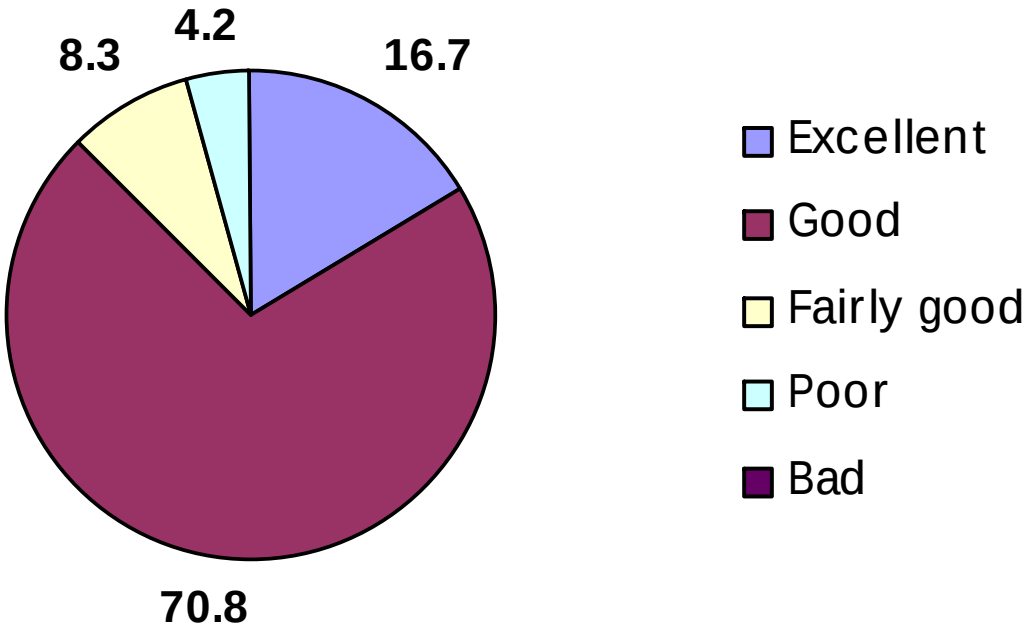


2. OUTCOME AND ACHIEVEMENTS



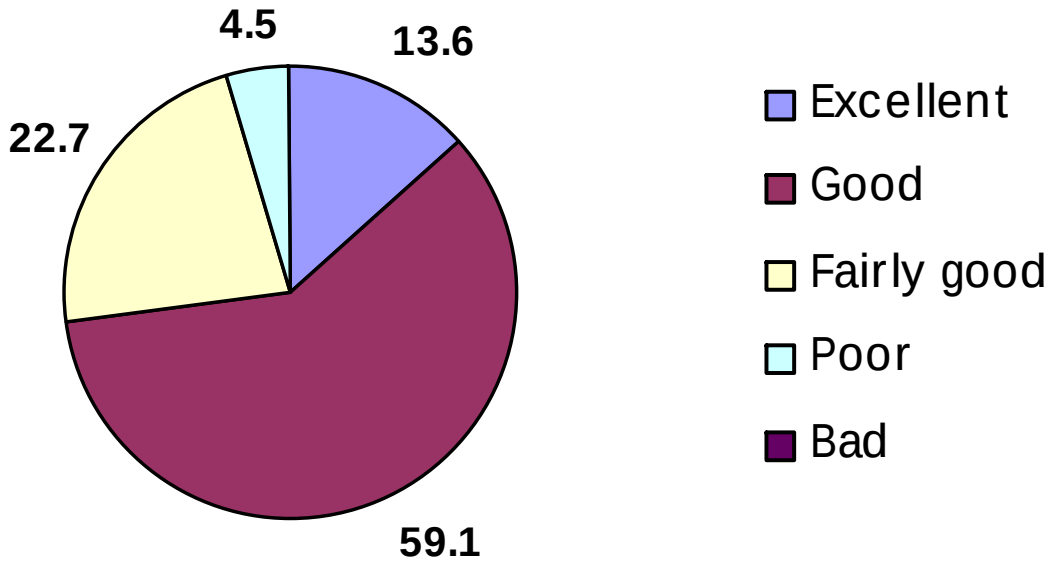
3. IMPACT OF COST ACTION

Impact of COST action



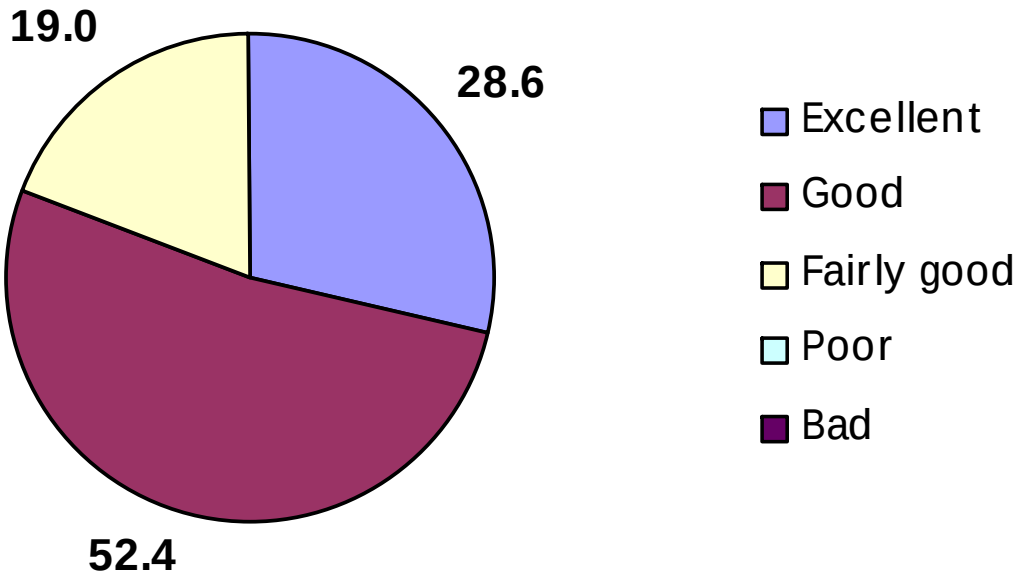
3. IMPACT OF COST ACTION

External “visibility”



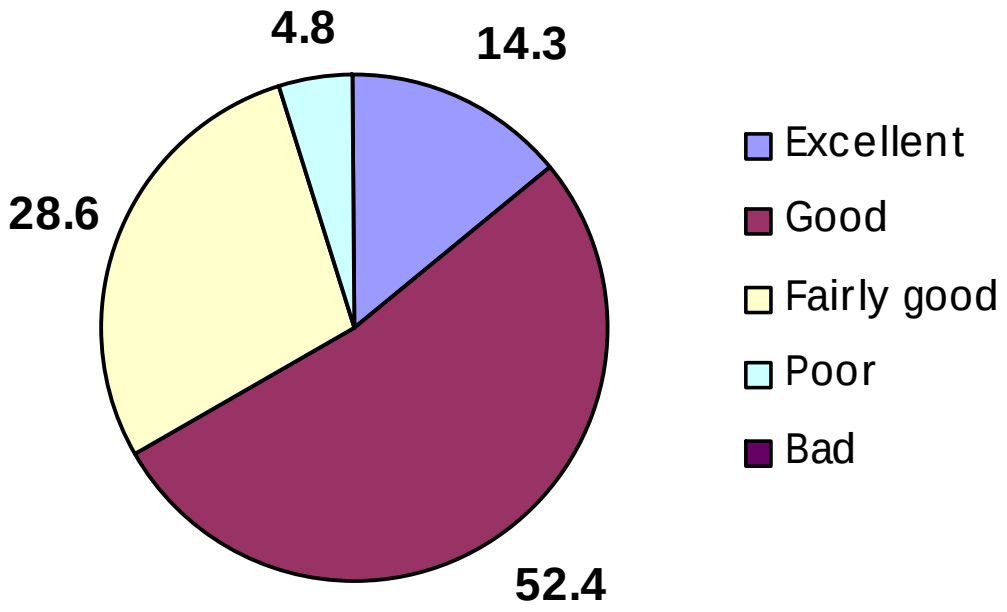
4. EUROPEAN ADDED-VALUE

National projects set up or running

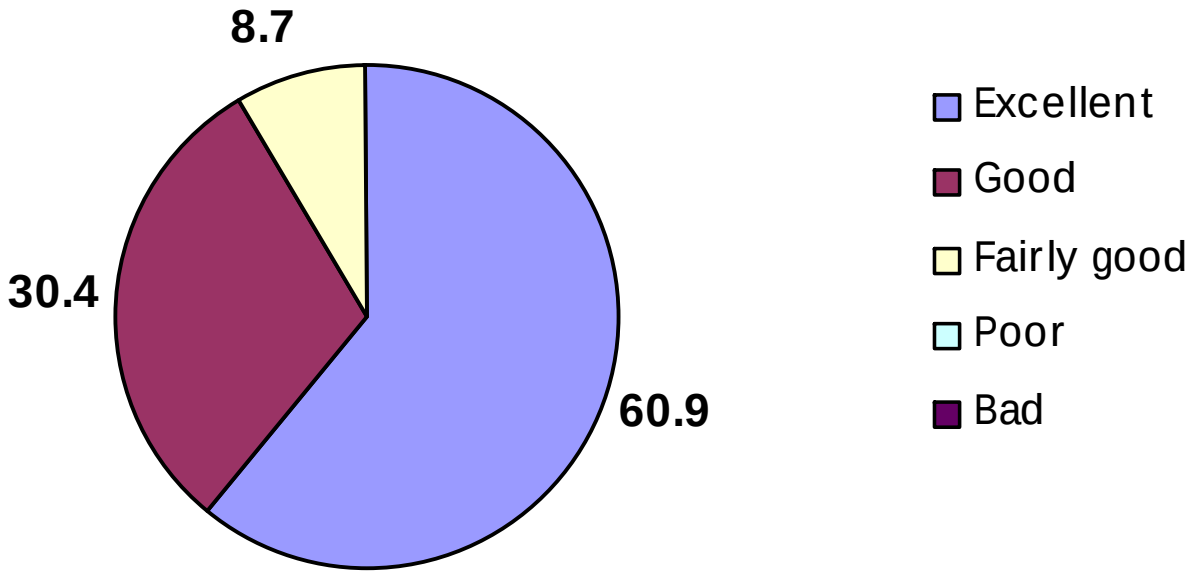


4. EUROPEAN ADDED-VALUE

International projects set up or running

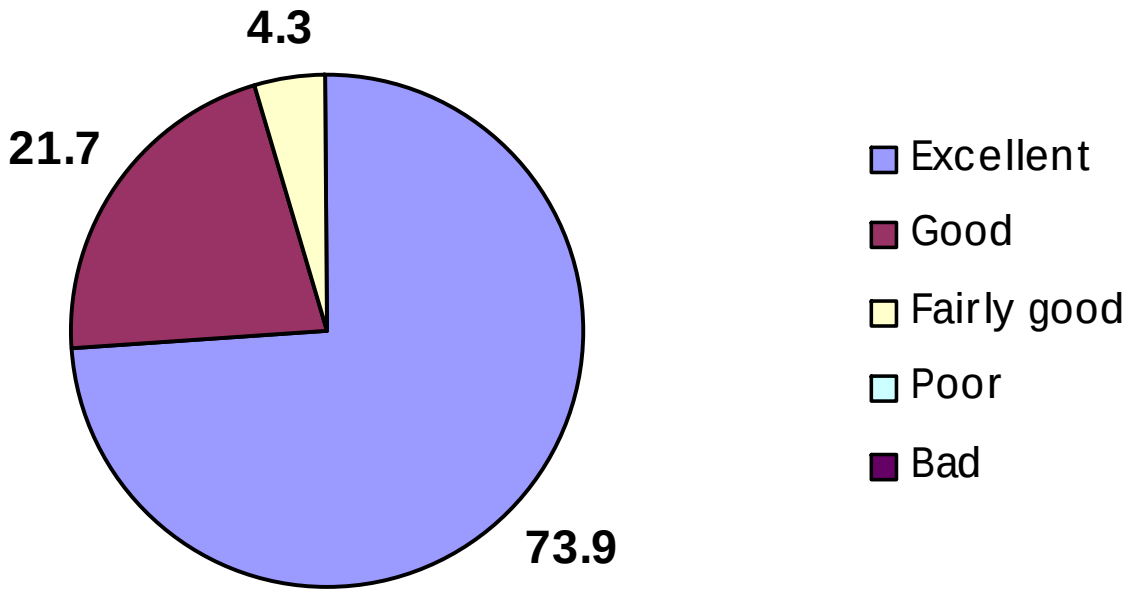


5. COORDINATION AND MANAGEMENT
Overall management of Action



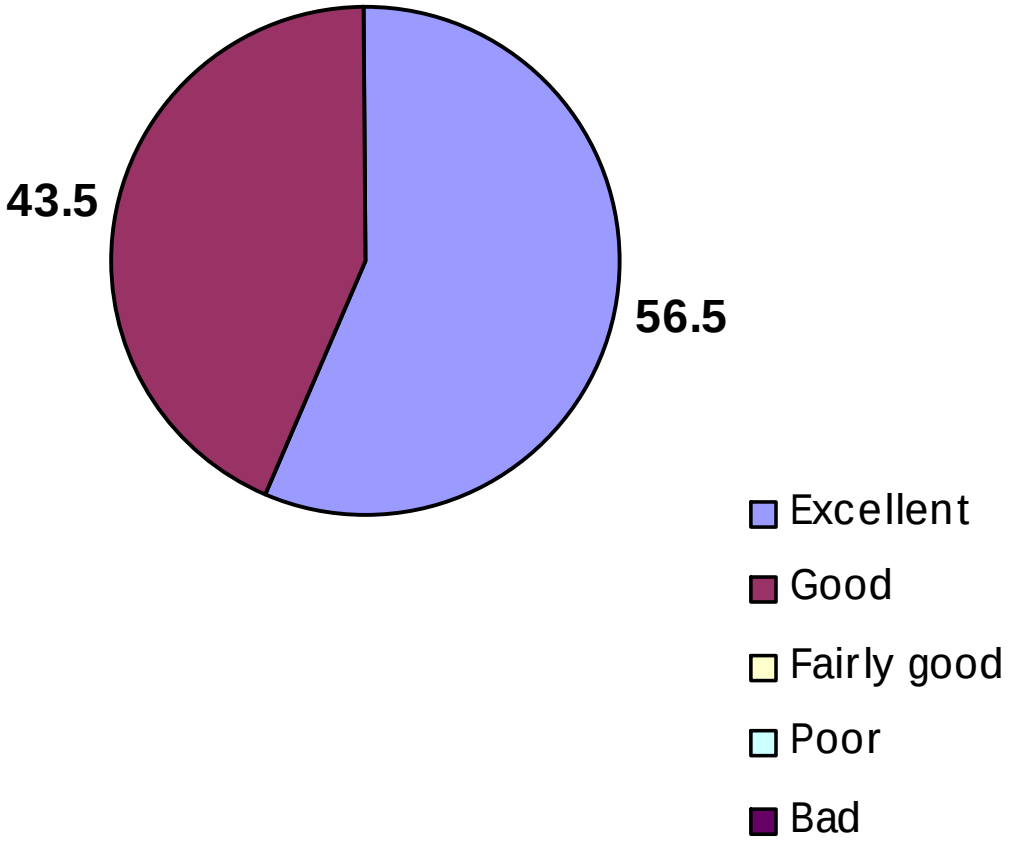
5. COORDINATION AND MANAGEMENT

Organisation of meetings

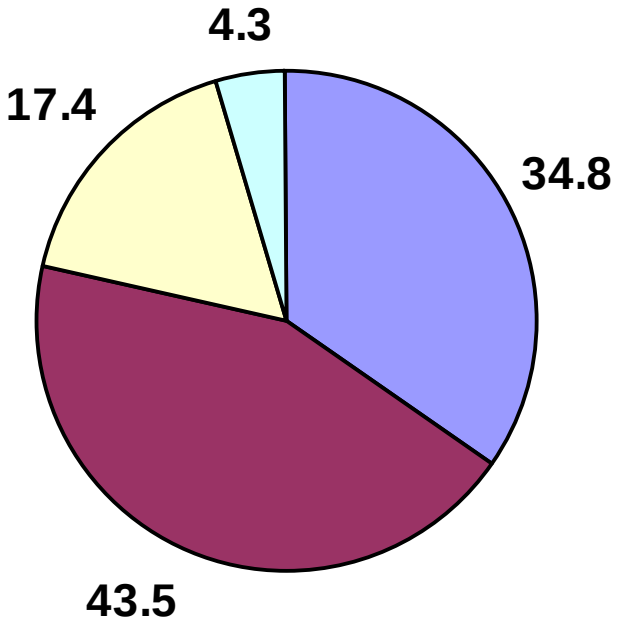


5. COORDINATION AND MANAGEMENT

Distribution of documents (including minutes, etc.)

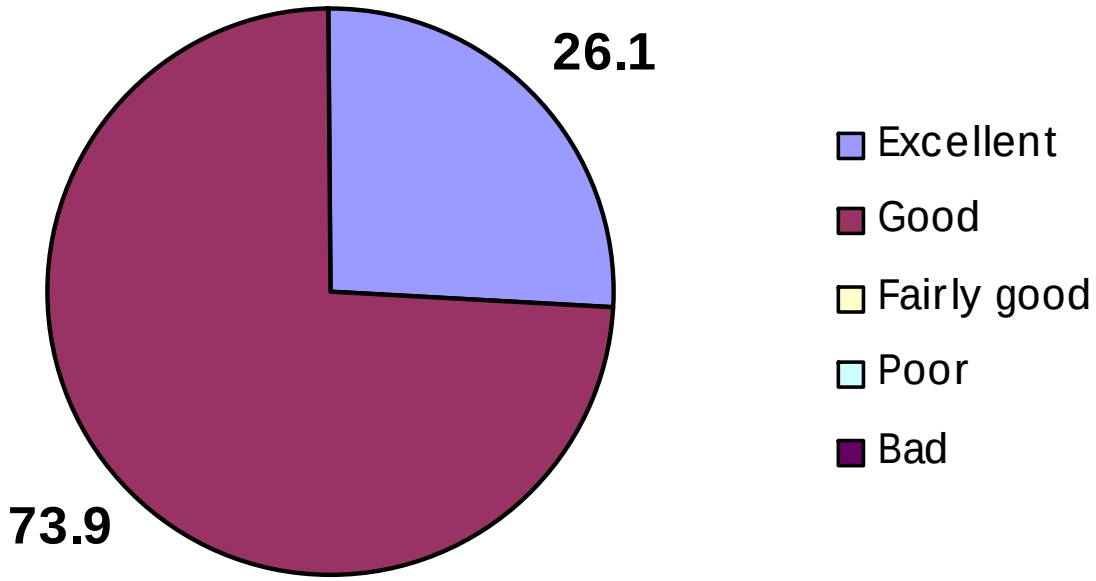


Usefulness of the COST homepage



6. DISSEMINATION AND RESULTS

Publications from meetings



Closure

Thanks to you all