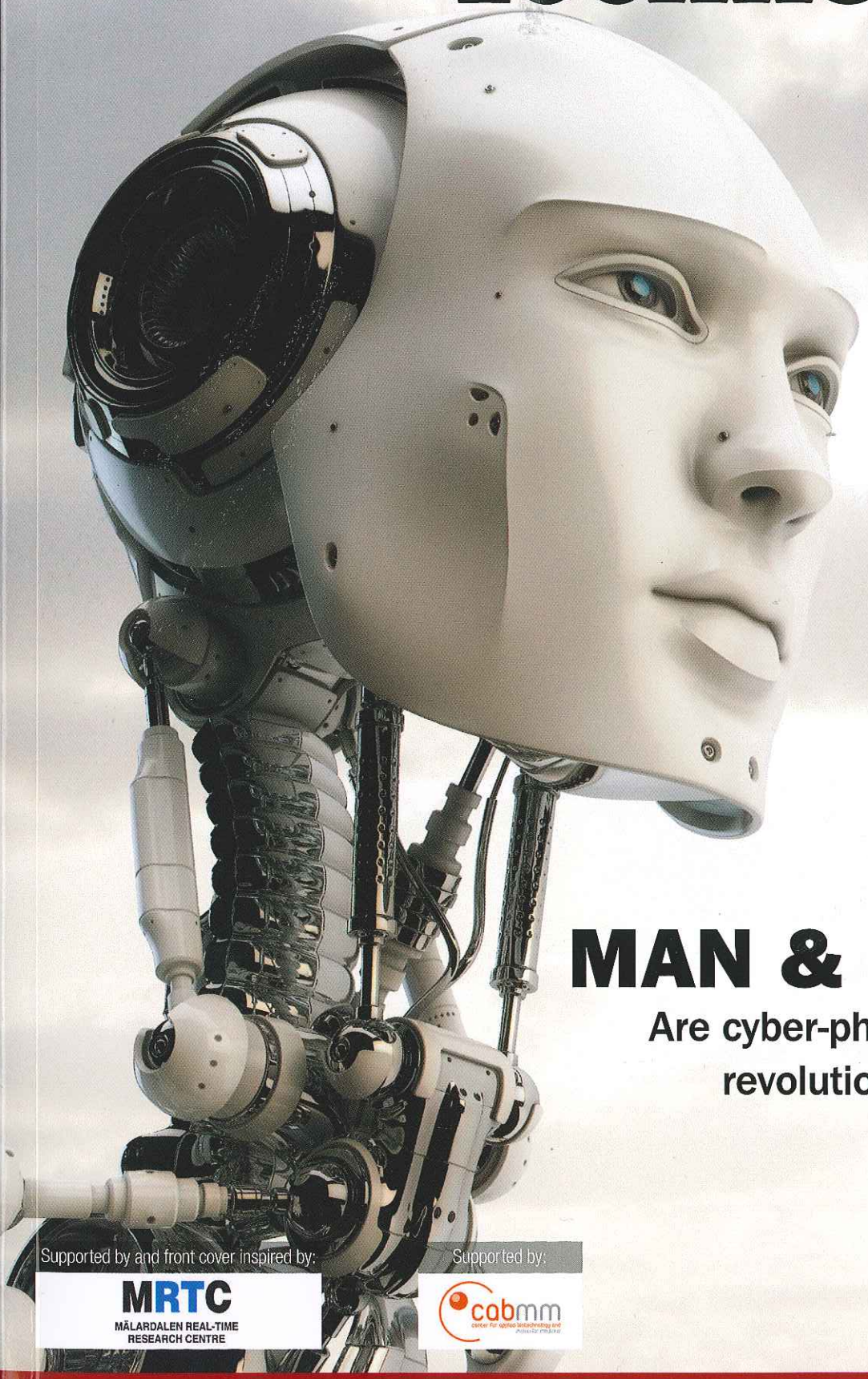
Pan European Networks

Science & Technology



MAN & MACHINE

Are cyber-physical systems set to revolutionise human society?

Supported by and front cover inspired by:
MRTC
MÄLARDALEN REAL-TIME RESEARCH CENTRE

Supported by:
cabmm

in association with:
European Science Foundation

HENRIK BENGTSSON OF THE MUNICIPALITY OF LERUM IN SWEDEN, ON HOW THE NOISUN PROJECT WILL GENERATE HEAT WHILE BLOCKING OUT NOISE POLLUTION

Sun block

The Swedish municipality of Lerum will build a 400m noise barrier consisting of solar collectors. The energy from the facility will be distributed to the district heating system. Based on preliminary studies, possible technical solutions have now been investigated, while challenges, including the exposed environment (road and railroad), complex foundation and narrow space have also been identified.

The Swedish municipality of Lerum, situated in the Gothenburg region, is divided by major thoroughfares for both road and rail traffic, and noise is one of the greatest environmental problems in the area.

Project partners are: The municipality of Lerum, SP Technical Research Institute of Sweden, Lerum Fjärrvärme AB and the Swedish Transport Administration.

The NOISUN project is outlined in PEN: *Science & Technology Issue 05,* December 2012, and a more detailed description of the project can be found at www.noisun.eu. Below is an update of the project's progress.

Report to the European Commission

The first report of the project has now been made to the European Commission, covering the project activities from June 2012 to December 2012.

The project's general progress follows the timetable and budget, except the planned analysis of the current noise situation, which has been postponed. The postponement depends on the on-going noise reduction actions (i.e. at the opposite side of the road with respect to the NOISUN barriers, another noise barrier is being built, scheduled to be finalised in late spring) which need to be finalised before the questionnaire and the noise measurements can be conducted. In addition, the winter tyre/studied tyre season must be over in order to obtain valid results.

Noise calculations

The calculation of noise levels has been initiated in order to determine the length and the height of the solar collector noise barrier. Preliminary calculations show that the noise barrier needs to be 3m above the rail top. With the detailed noise calculations, we will then decide on the final height of different sections of the barrier. The calculations will also be used to determine the final length of the barrier.

A survey on the perceived noise disturbance will be made in the residential area, both before and after the facility has been built. The answers from the questionnaire will be linked to the noise level.

Complex foundation

The solar collector noise barrier will be built on the railway embankment as close as possible to the railroad. The embankment slopes sharply on the stretch, and the construction will set high standards for the foundation, which will need to be solid, and which therefore implies that inclined poles drilled into the embankment will likely be needed in order to handle wind load, inflation pressure from passing vehicles etc.

Peak power

The peak power capacity of the solar collectors is higher than the minimum demand in the district heating net. This means that, in some periods during the summer, the solar facility will produce more energy than can be handled in the district heating network. Various solutions have been studied to handle this.

The use of a 60° angle of inclination of the solar collectors has been suggested as one solution. A 90° angle has also been studied in order to lower the peak power. However this would not affect the instantaneous power to the district heating net much, instead we will lose energy on an annual basis. Consequently we will angle of the solar collectors at 60°.

To handle the peak power, the facility has to be equipped with a water cooling system for emergency cooling. This will require a water and sewage connection to the facility's technical building.

Narrow space

In the planning of the solar collector noise barrier, there are various safety regulations that must be satisfied, mainly due to the short distance to the railway and the local road. A few examples of the requirements are: distance to high-voltage parts; distance to tracks; and distance to the local road. The barrier will be placed as close to the tracks as possible in order to get the best noise reduction.

Thanks to the 60° angle of inclination of the solar collectors, the barrier can be high enough while safety distance to the high-voltage parts is managed. To meet the safety requirements for the local road, the road may have to be moved sideways a few metres and a crash barrier will likely be needed.

The design

The stretch varies in elevation, which means that the barrier needs to be levelled in steps, to find both an appealing and a cost-effective solution.

A design proposal will be developed, including the levelling and the side towards the local road, which will preferably be designed with trellis and vegetation in a maintenance-free and cost-effective solution.

Henrik Bengtsson
Project Manager
Municipality of Lerum

email henrik.bengtsson@lerum.se
browse www.noisun.eu
www.lerum.se