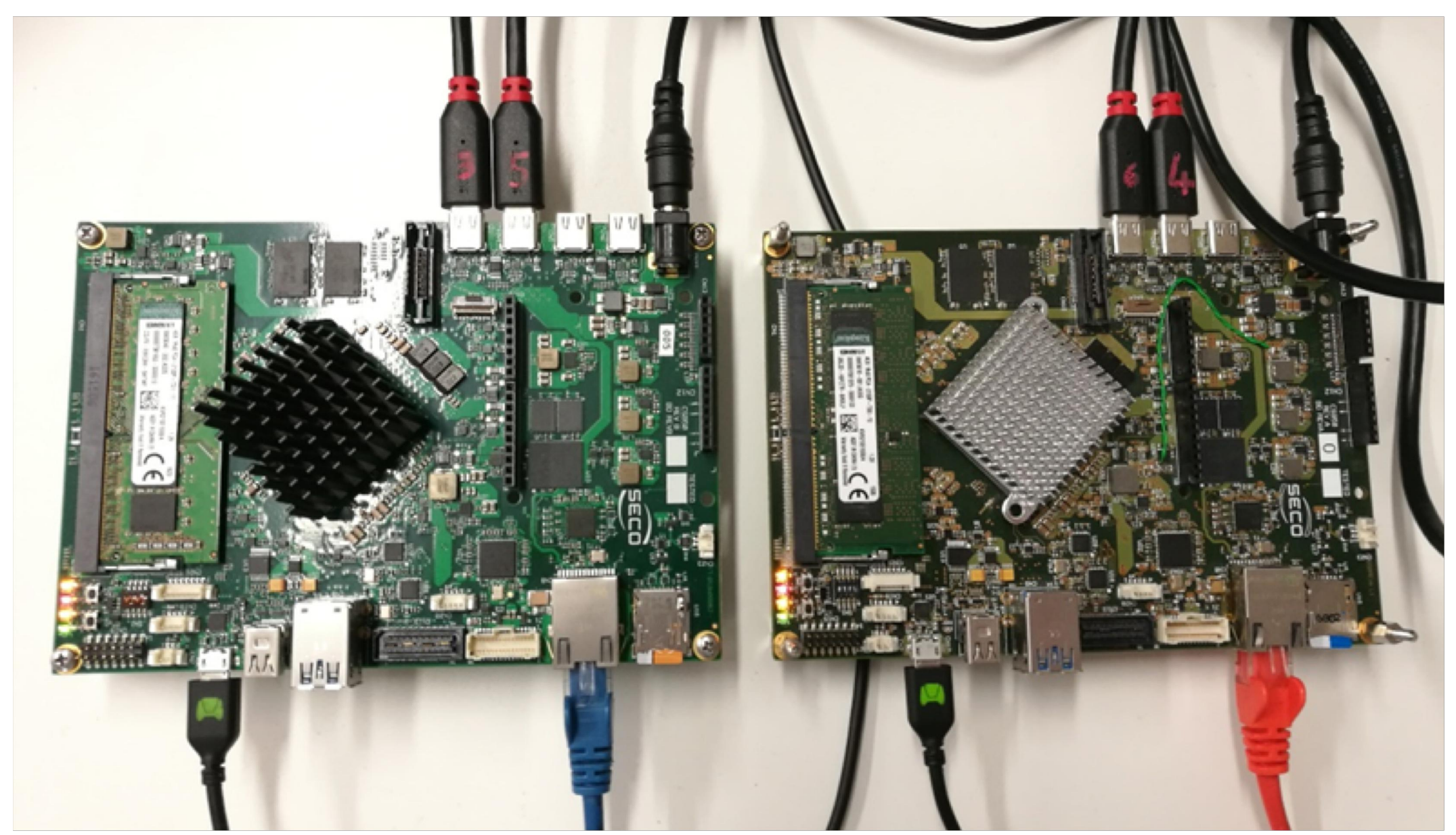




<http://www.axiom-project.eu>

ICT-01-2014 GA 645496

Agile, eXtensible, fast I/O Module
for the cyber-physical era

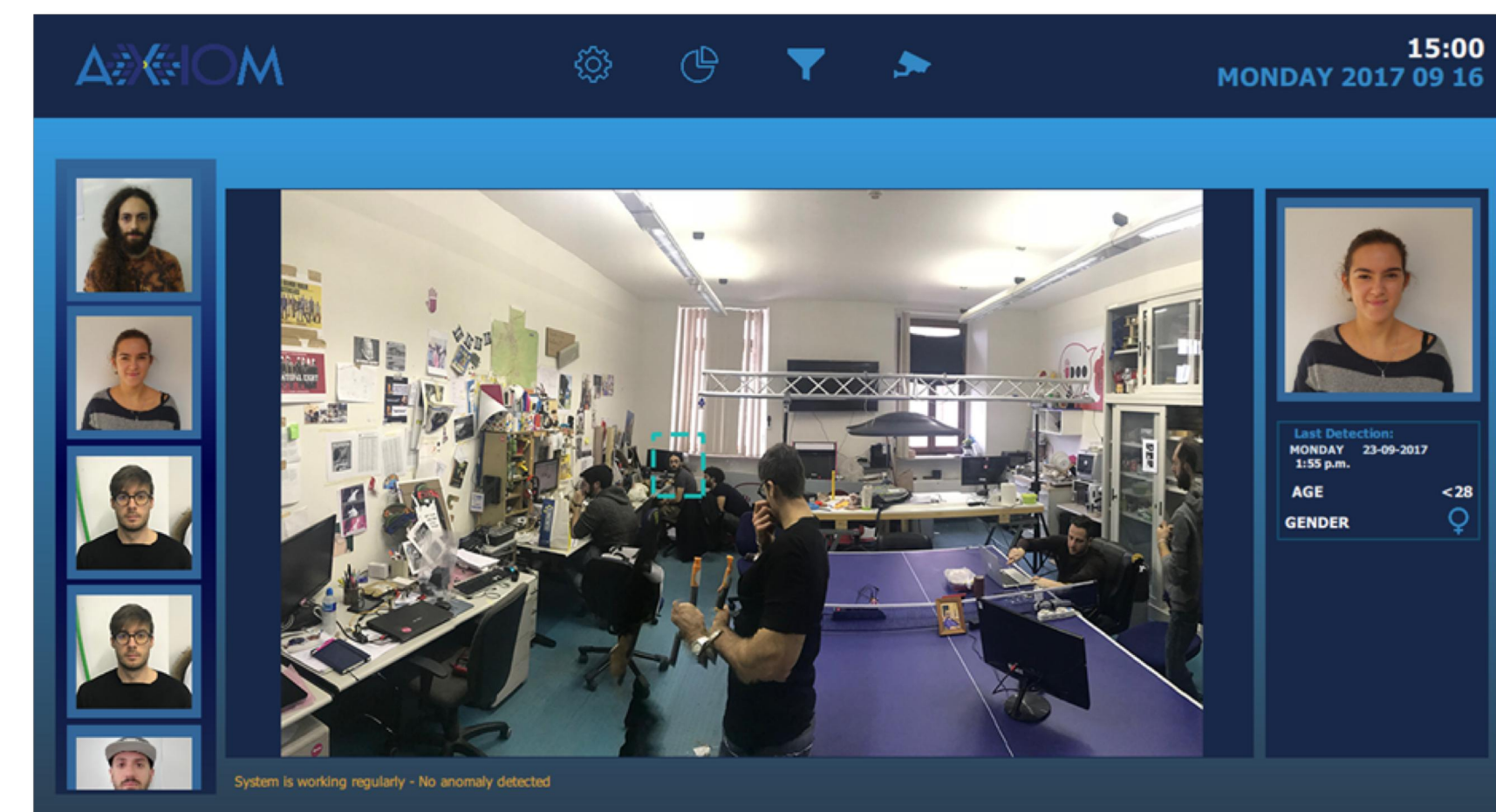
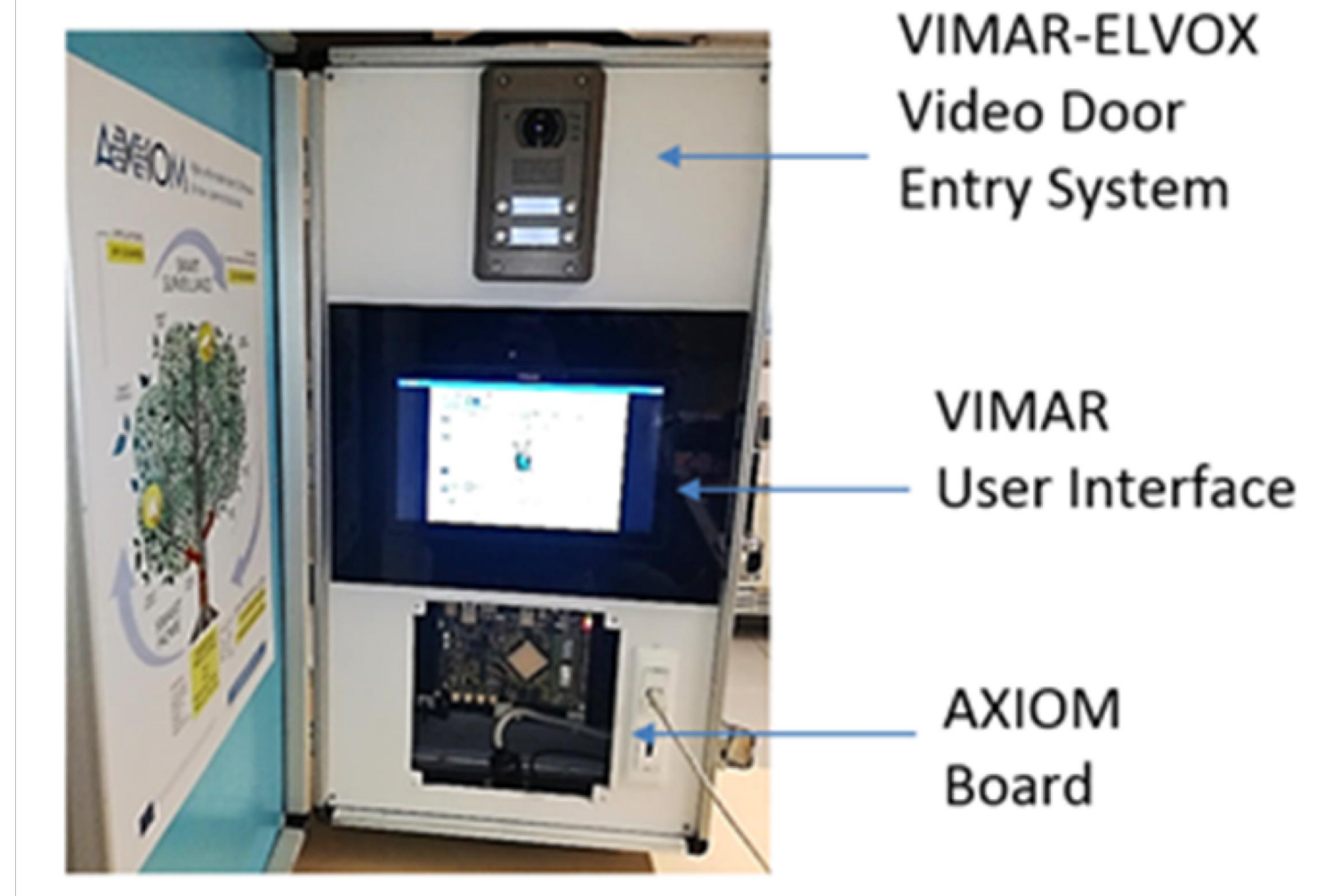


START DATE: 01 Feb 2015
DURATION: 3 YEARS
EU FUNDING: 3'946 k €
COORDINATOR: prof. Roberto Giorgi
giorgi@unisi.it



GOAL: EU HW/SW DESIGNED AND MANUFACTURED SINGLE BOARD COMPUTER
THAT CAN BECOME THE HEART OF FUTURE SMART APPLICATIONS

WP1: MANAGEMENT, WP2: DISSEMINATION, WP3: SCENARIO DEFINITION AND APPLICATION PORTING



PRESENTED AT



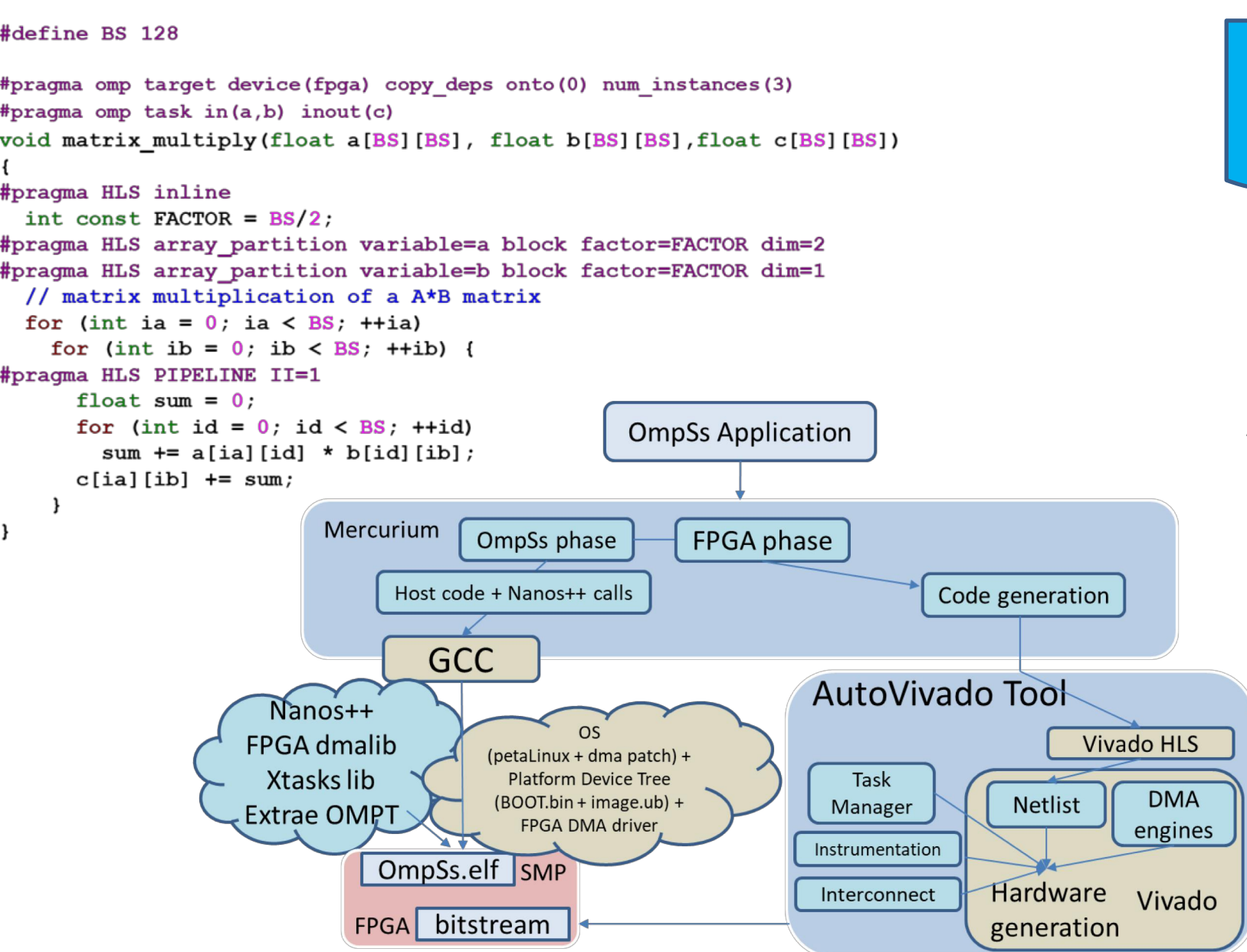
SMART
HOME

AXIOM enables companies, such as VIMAR, to improve real time data analysis of its Energy Management catalogue and to extend the network from the home to a large number of existing or near future services.

SMART
VIDEOSURVEILLANCE

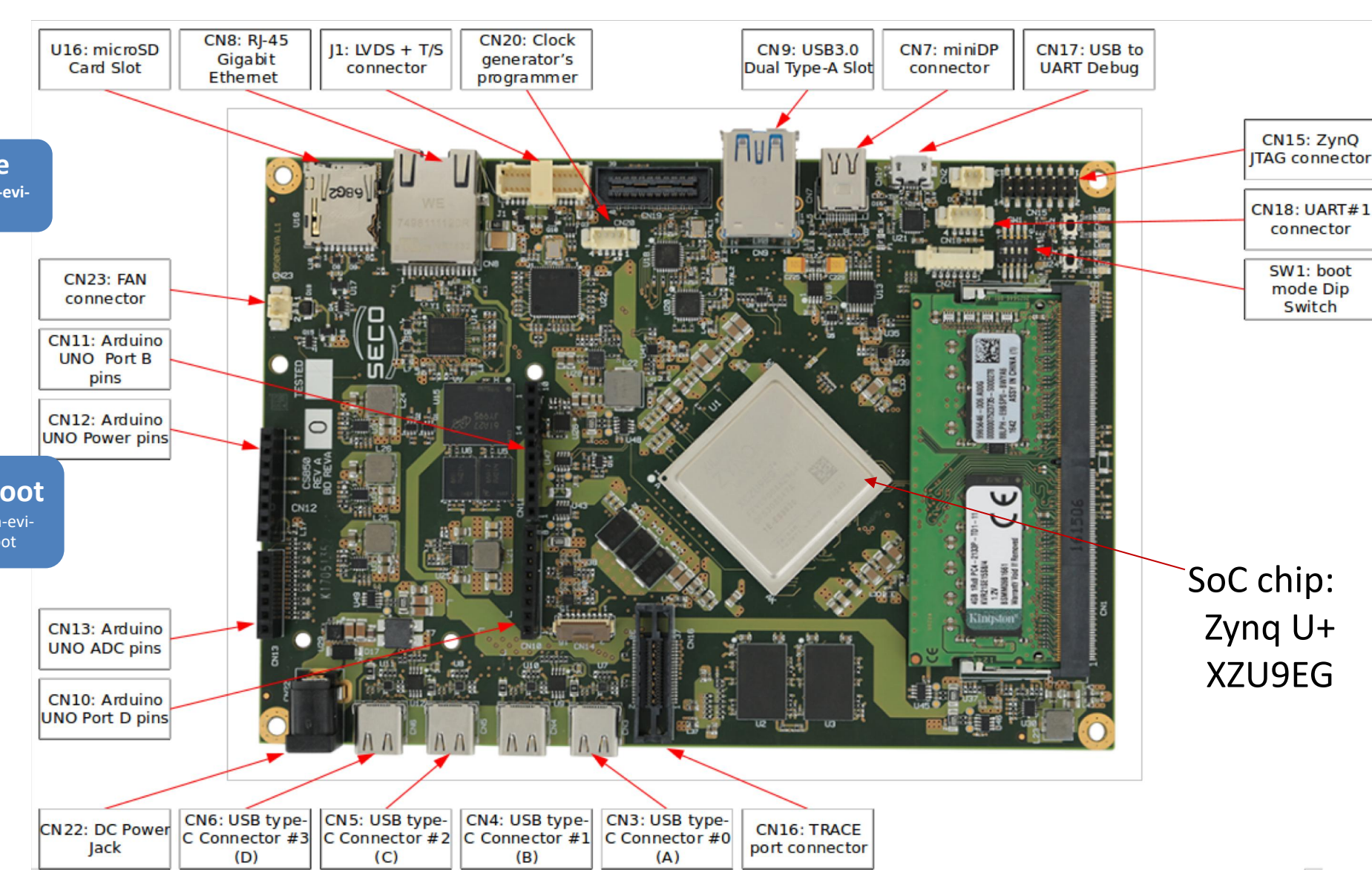
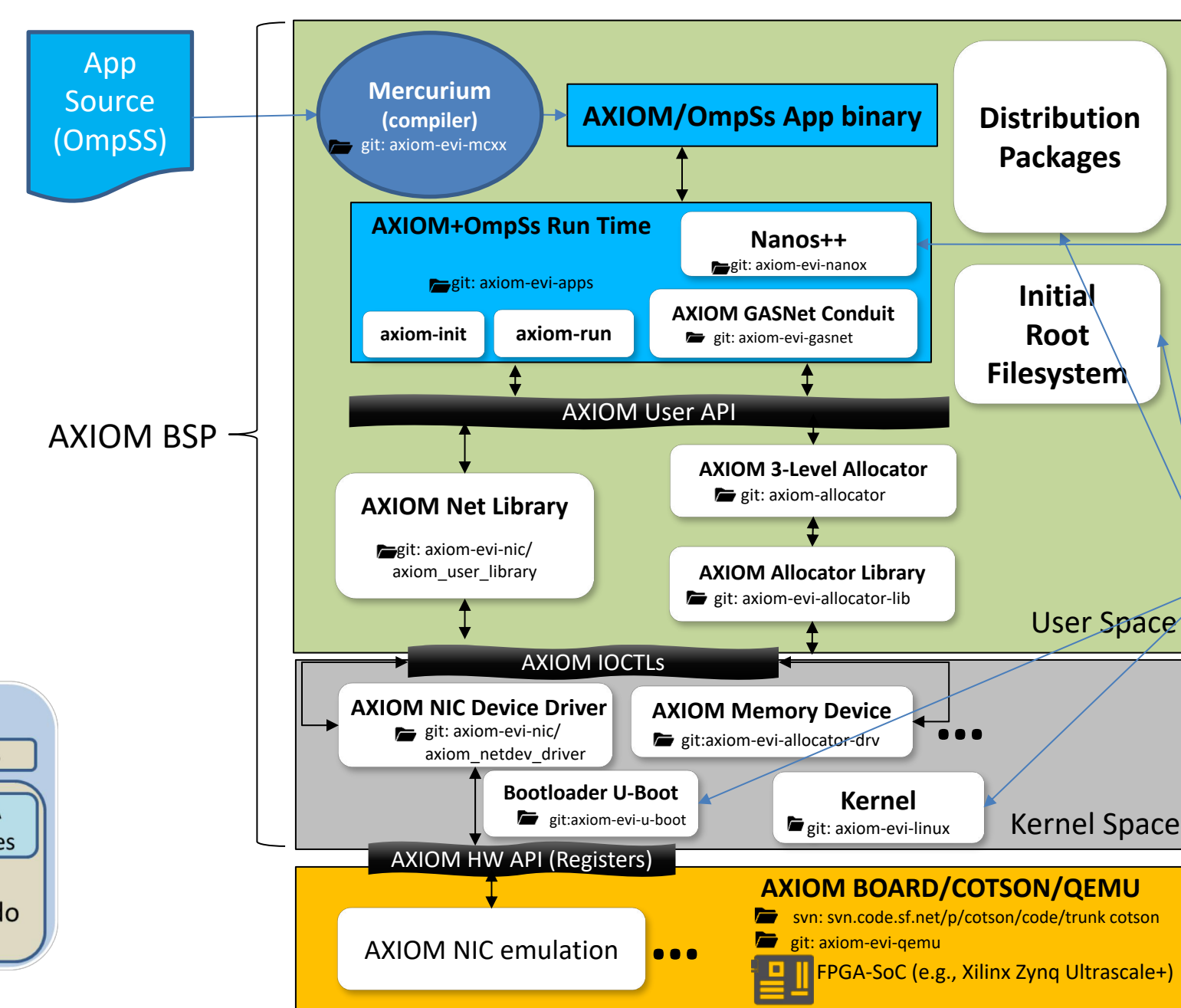
AXIOM enables companies, such as HERTA, to deploy their multiple face recognition in real-time in crowded and changeable environments

WP4: Programming Model, WP5: RUNTIME AND OPERATING SYSTEM, WP6: ARCHITECTURE IMPLEMENTATION

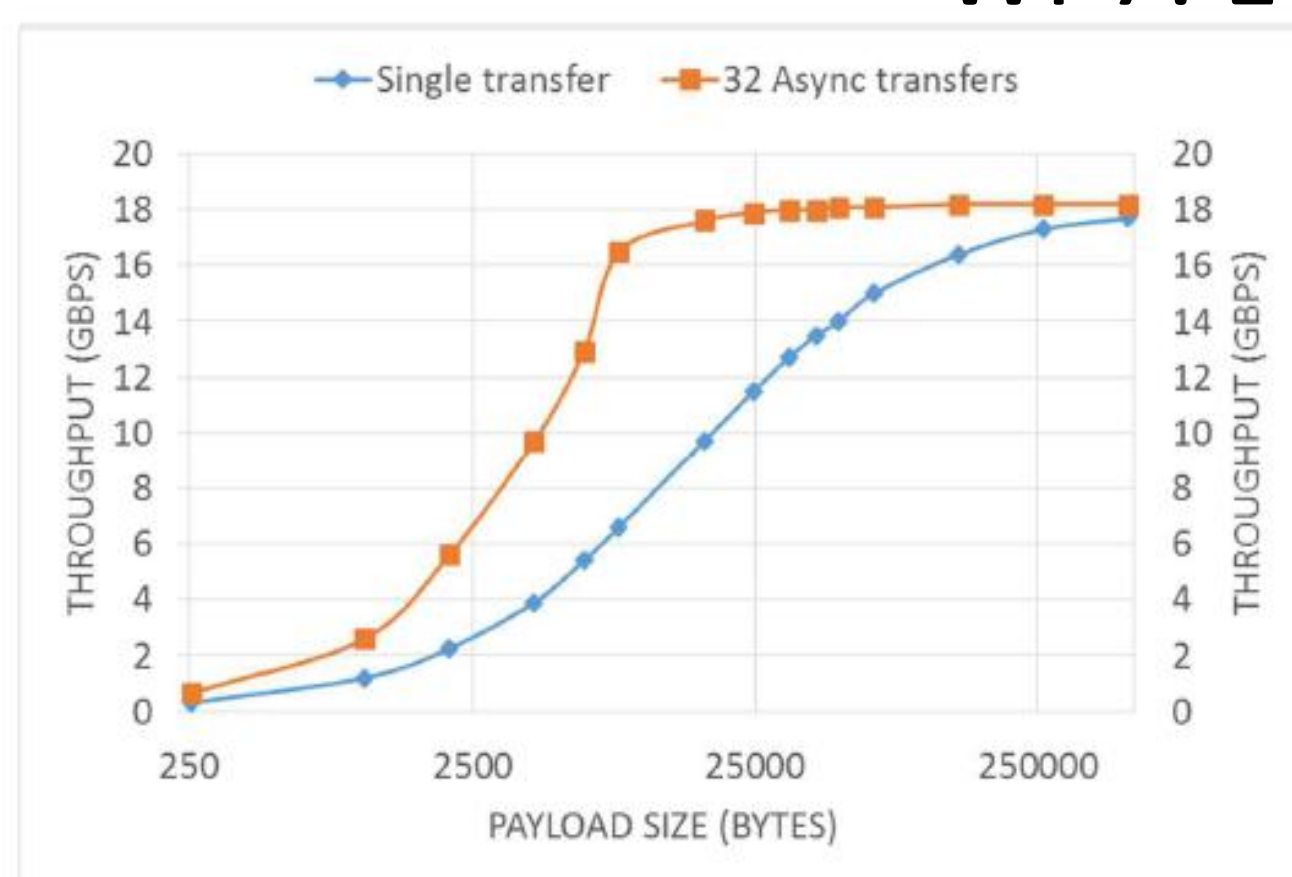


AUTOVIVADO tool: see <https://pm.bsc.es/ompss-at-fpga> for more info

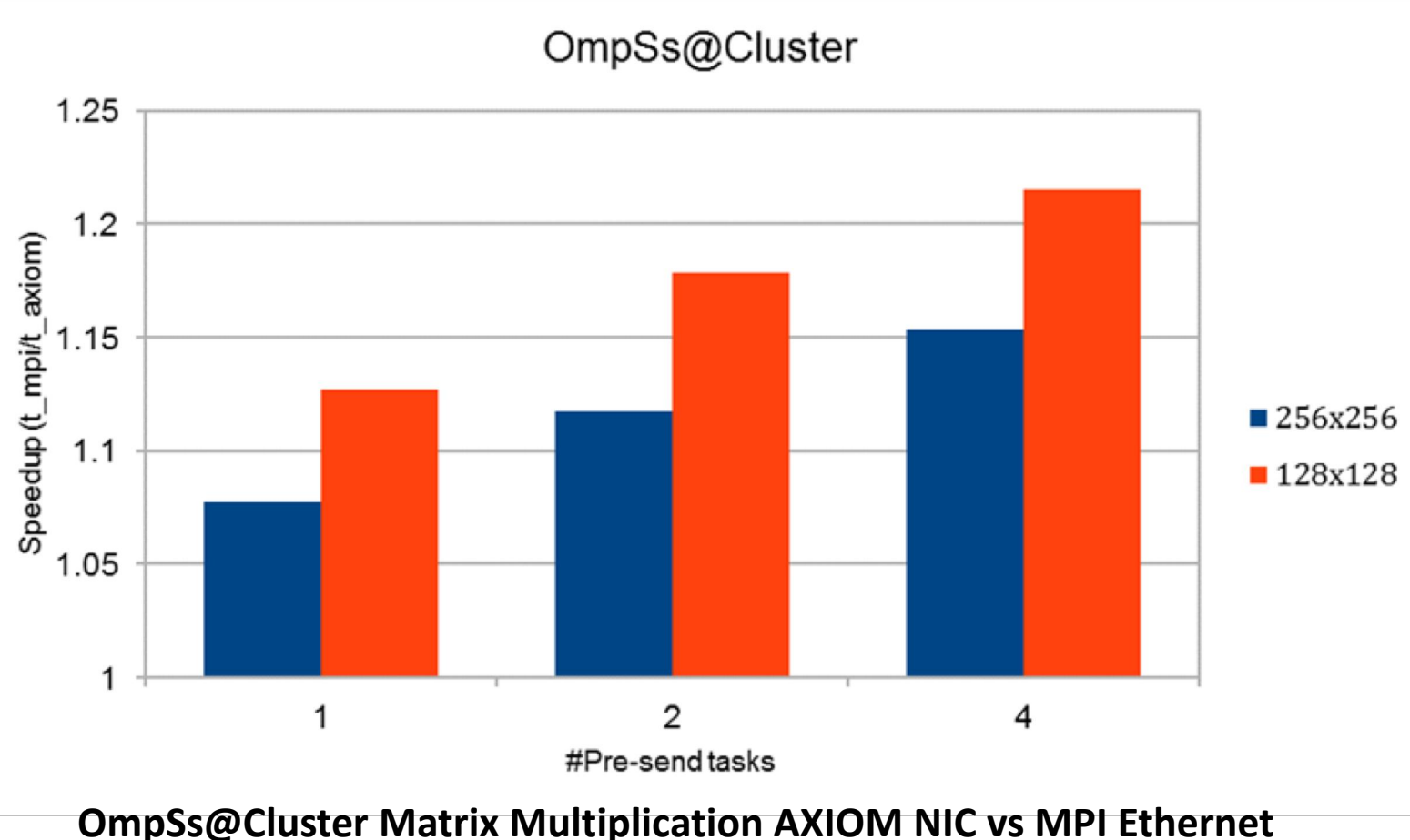
1M+ lines of Open Source C Code: <http://git.axiom-project.eu>



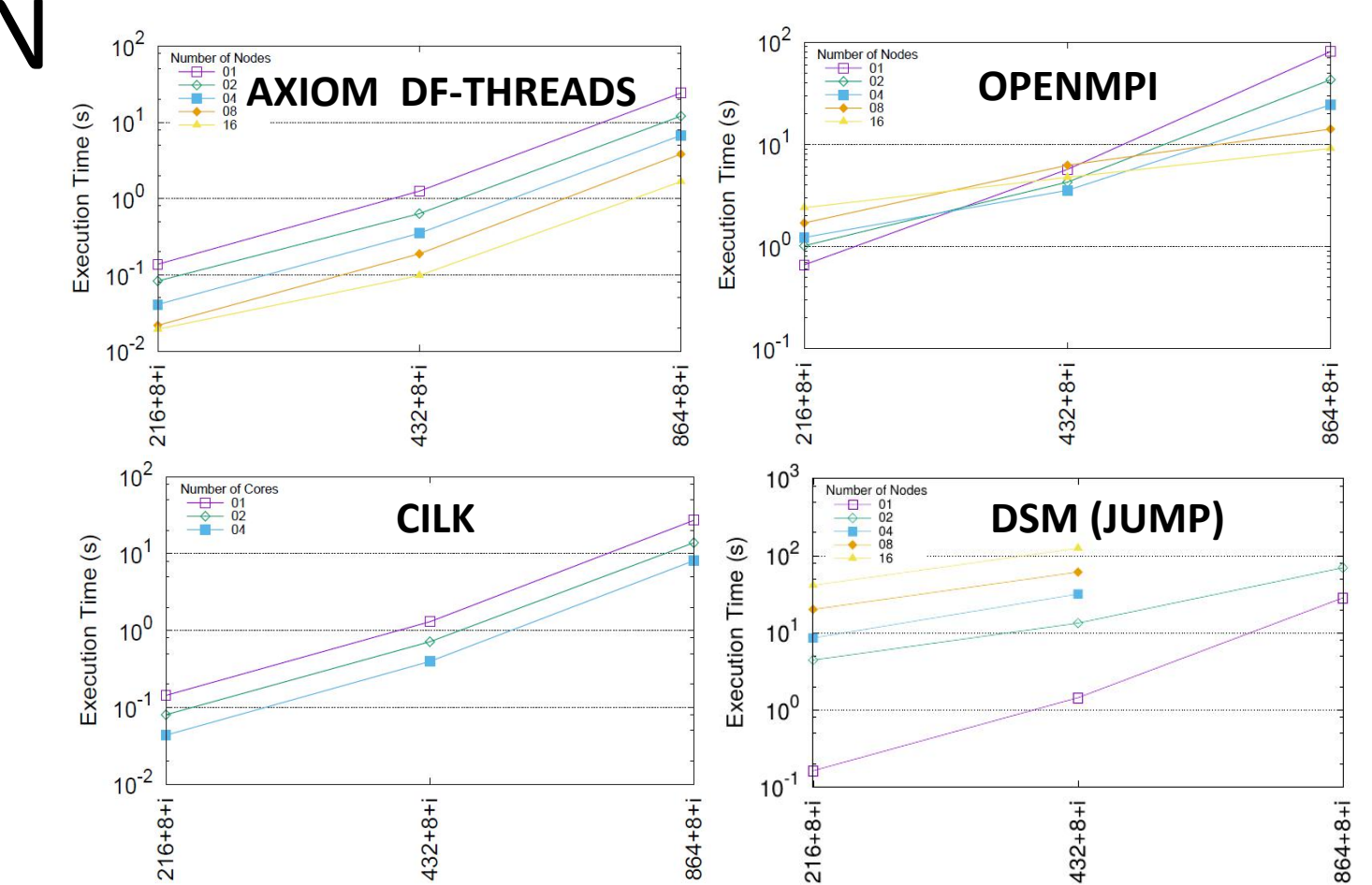
WP7: EVALUATION AND DESIGN SPACE EXPLORATION



RDMA write / read throughput between two nodes: 18 Gbps!



OmpSs@Cluster Matrix Multiplication AXIOM NIC vs MPI Ethernet



DF-Threads vs CILK++ vs OpenMPI vs JUMP Matrix Multiplication on AXIOM Board [1]

AXIOM OBJECTIVES

- OBJ1) Realizing a small board that is flexible, energy efficient and modularly scalable**
 - Flexibility: FPGA, fast-and-cheap interconnects based on existing connectors like SATA
 - Energy efficiency: low-power ARM, FPGA
 - Modularity: fast-interconnects, distributed shared memory across boards
- OBJ2) Easy programmability of multi-core, multi-board, FPGA**
 - Programming model: Improved OmpSs
 - Runtime & OS: improved thread management

OBJ3) Leveraging Open-Source software to manage the board

- Compiler: BSC Mercurium, OS: Linux, Drivers: provided as open-source by partners

OBJ4) Easy Interfacing with the Cyber-Physical Worlds

- Platform: integrating also Arduino support for a plenty of pluggable board (so-called "shields")
- Platform: building on the UDOO experience from SECO

OBJ5) Enabling real time movement of threads

- Runtime: will leverage the EVIDENCE's SCHED_DEADLINE scheduler (i.e. EDF) included Linux 3.14, UNISI low-level thread management techniques

OBJ6) Contribution to Standards

- Hardware: SECO is founding member of the Standardization Group for Embedded Systems (SGET)
- Software: BSC is member of the OpenMP consortium

TOWARDS
HPC+EMBEDDED
CONVERGENCE

