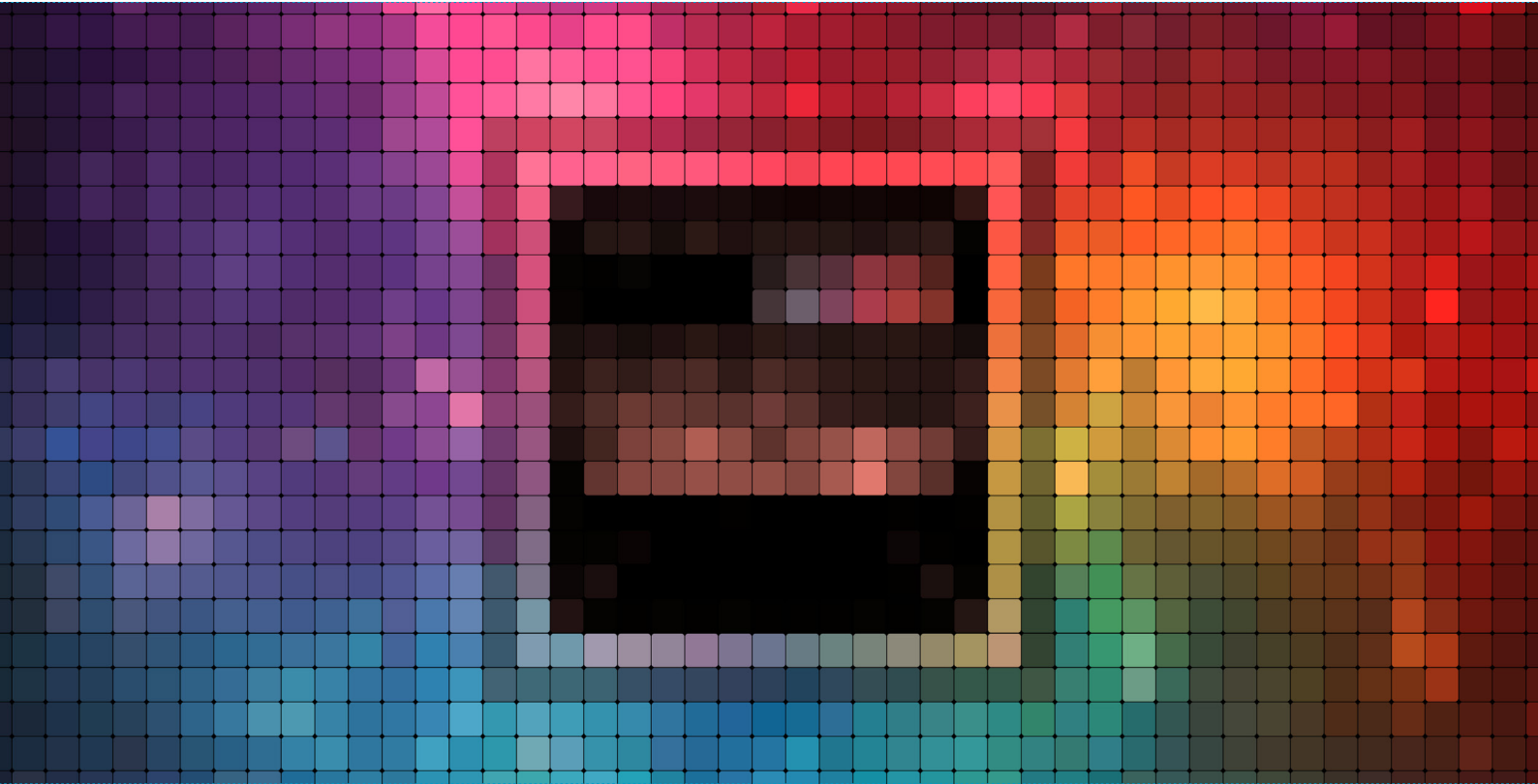# ALMARVI

ALgorithms, design methods, and MAny-core execution platform for low-power massive data-Rate Video and Image processing

EXECUTIVE *summary*

ALMARVI provides a cross-domain many-core platform solution, system software stack, tool chain and adaptive algorithms for massive data-rate image/video processing with high energy efficiency. There are mechanisms and support for high adaptability, abstracting from variations in underlying platforms and application behaviour.

CONTRIBUTION *to SRA*

The ALMARVI project provides the core of solutions for major societal challenges, like affordable healthcare and well-being, green and safe transportation and reduced consumption of power. ALMARVI will:

> Enable cross-domain re-use and interoperability for different product categories and application domains, thus promoting the cross-fertilisation and reuse of technology results.

> Facilitate predictable system and product properties and robust solutions.

> Develop joint hardware-software techniques for resource and power management, yet provide massive data-rate processing and supporting interoperability over cross-domain platforms.

MARKET INNOVATION *& impact*

Advanced image and video processing systems are becoming a crucial and resource-consuming part of embedded applications in many sectors. This project facilitates the transition from a vertically structured to a horizontally structured market. It:

> Reduces overall system design cost and time-to-market.

> Enables low-cost solutions for high-volume markets in different industrial domains.

> Creates new market opportunities, in particular supporting SMEs.

The demonstrators for the healthcare, security/surveillance/monitoring and mobile use cases will directly lead to marketable applications and products in their respective domains. Integrated releases of the image/video processing algorithm libraries, reference design tools and platforms, and system software stack solutions will be made available, along with their evaluation for the demonstrated use cases. Cross-domain applicability will reduce fragmentation, thus increasing the market share of the European supplier industry.

RELEVANCE & CONTRIBUTIONS *to Call 2013*

> Reduce the cost of the system design by 20% - 30% through modularity, flexible interfacing, adaptive architecture, execution platform with well-developed tool chains, adaptability and run-time configurability.
> Reduce development cycles by 25% - 35% through seamless scalability and integration of hardware and software components and cross-domain component reuse, cross-domain system software stack, design tools and understanding of relevant system layers.
> Manage an increase in complexity with a 30% - 60% reduction of effort through novel algorithms, architecture, design tools, execution platforms, and system software stack with run-time adaptive resource and power management techniques.
> Reduce effort and time for re-validation and re-certification by 15% - 20% through incremental design, development, testing, integration and validation cycles.
> Cross-sector reusability of Embedded Systems by 20% - 50% through system architecture accounting for the common requirements of different sectors and application domains.

R&D INNOVATION *and technical excellence*

The key is to leverage the properties of image/video content, while concurrently adapting algorithms and hardware, in order to achieve much higher potential for power savings and to enable massive data-rate processing.

At the Application layer, the goal is to adapt algorithms towards the architectures. At the System Software Stack layer, the adaptive run-time system allocates resources to different applications with simultaneous, energy-efficient execution. At the Hardware layer, the ALMARVI's many-core execution platform provides the computing capabilities to diverse image/video processing applications.

Relevant topics:

> Automatic extraction of image/video content properties, deriving resource/power requirements of image/video processing algorithms and forwarding them to the hardware layer for enhanced resource and power management.
> Negotiating between algorithms and hardware, such that in the event that the underlying hardware does not provide the required performance/power efficiency (for instance, due to workload, resource, bandwidth and/or process variations), algorithms self-adapt to curtail their computational requirements, while trading off the quality requirements.
> Identifying and exposing the knobs at algorithmic level, in order to control the algorithmic computational complexity.

Objective-1 – Enabling Massive Data-Rate Processing
Objective-2 – Achieving Low-Power Consumption
Objective-3 – Composability, Flexibility and Cross-Domain Applicability
Objective-4 – Robustness to Variability

PROJECT *partners*

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START
1 April 2014

DURATION
36 months

TOTAL INVESTMENT
€16.68 m

PARTICIPATING ORGANISATIONS
16

NUMBER OF COUNTRIES
4