

# *Computing Systems in FP7*

## *Call 1 results*

### *and future prospects*

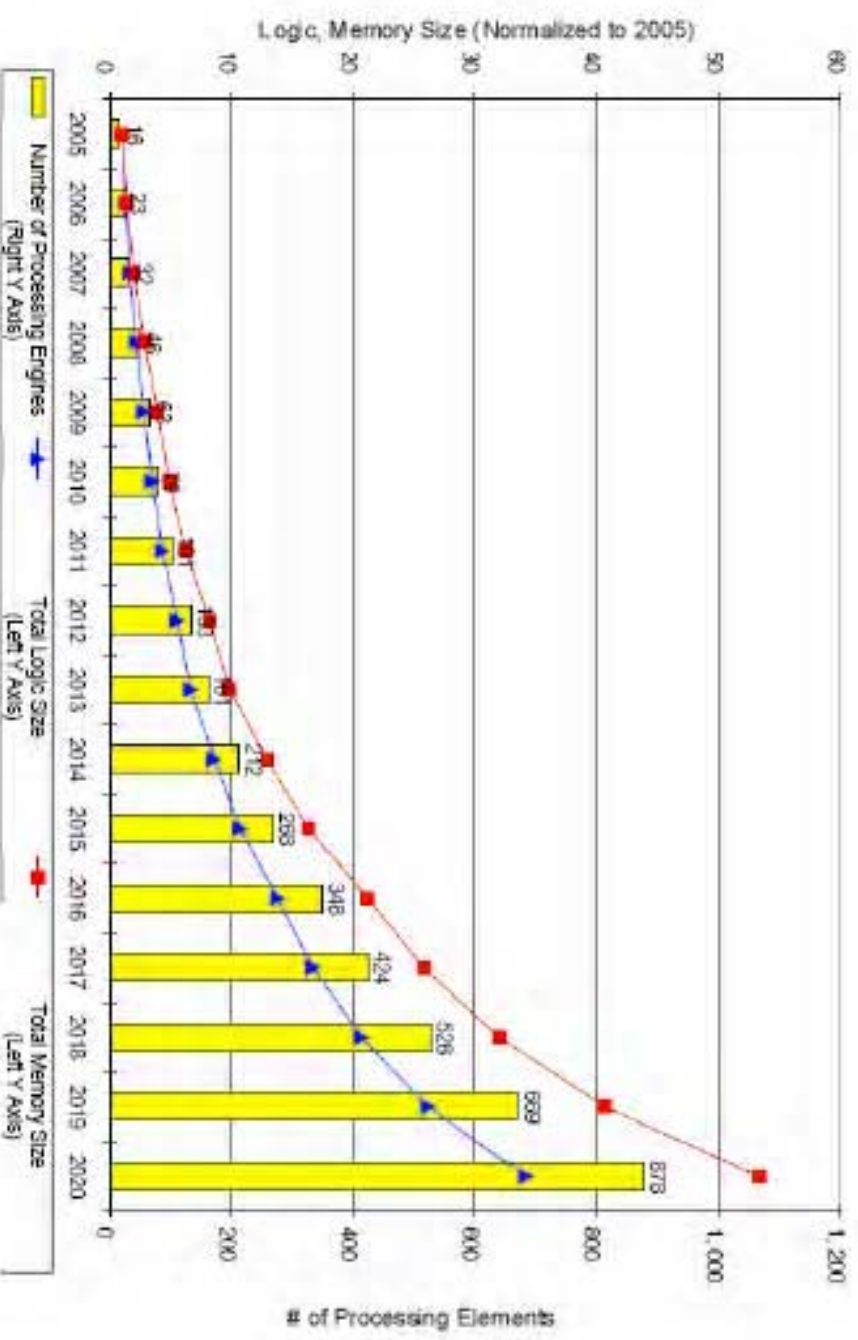
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Computing Systems Objective Coordinator

# Presentation Outline

- **Computing Systems: Call 1 Results**
- Computing Systems: Future Prospects

# Background of Call 1

In embedded computing, the multicore architectures are proliferating due to the need to support more applications



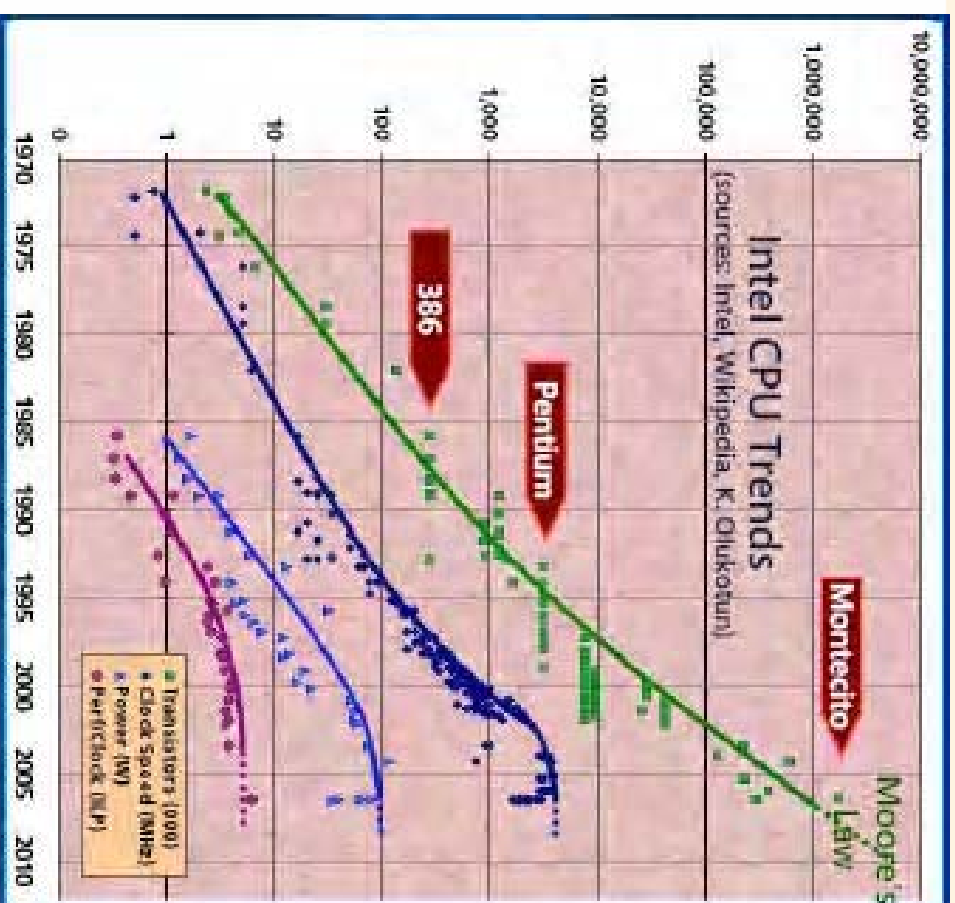
## SOC Complexity

Source: ITRS

# Background of Call 1

Transistor densities are constantly increasing but previous architectural solutions were not scaling.

In general-purpose computing, multicore architectures are providing the new performance boost.



From: Sutter, MPSOC 2006

# Computing Systems

## Call-1 Content

### Call 1 Target outcomes:

- a) Novel architectures for multi-core computing systems
  - On-chip systems incorporating multiple processing elements in both “embedded” and “general purpose” markets
  - Key research challenges: versatility, programmability
  - Instruments: STREP and NOE
- b) Reference architectures for generic embedded platforms
  - As generic as possible, cutting across application domains
  - Related to the Artemis SRA
  - Instruments: STREP

Budget: 25 M€

# Computing Systems - *Analysis (1)*

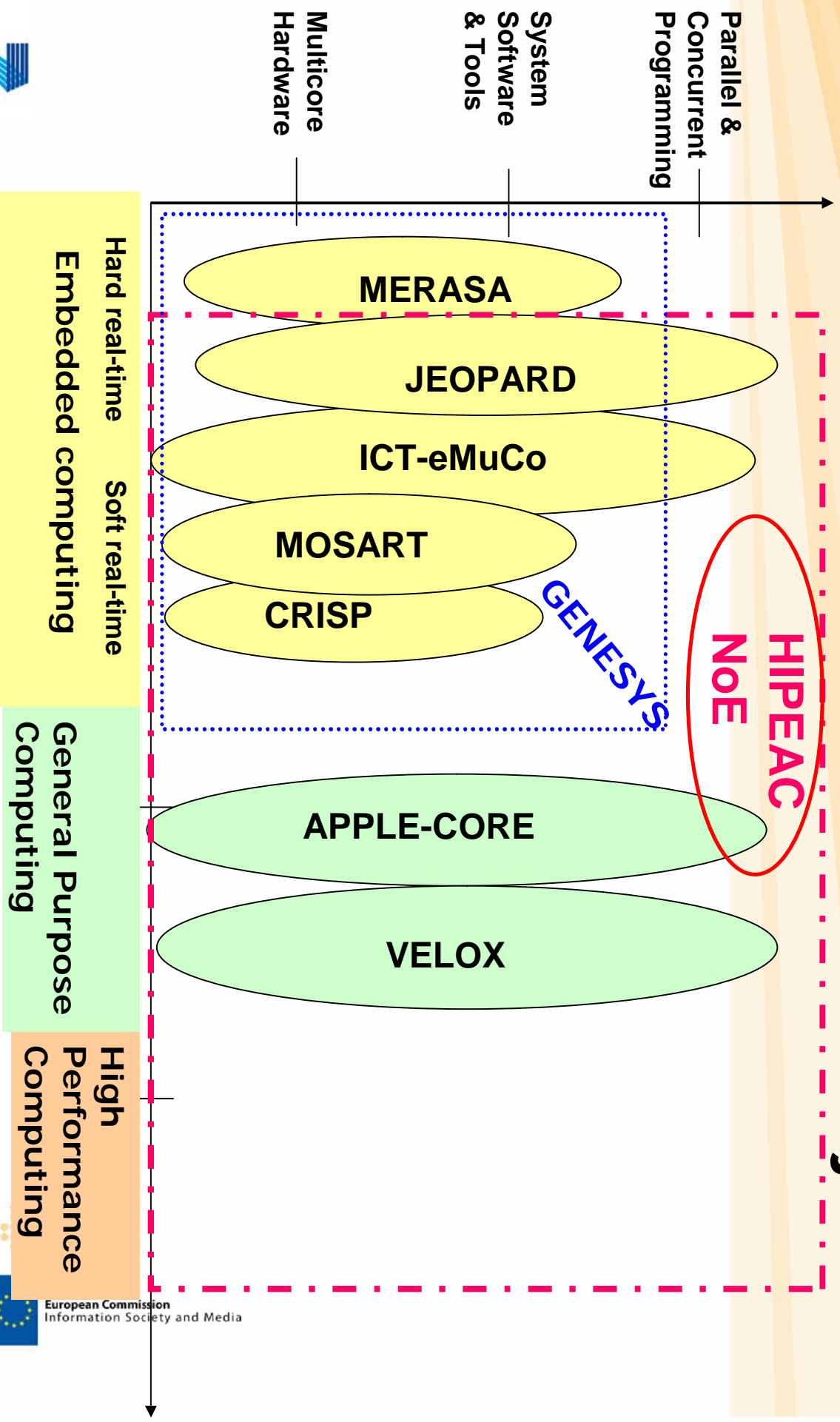
Received proposals	Above threshold	Funding
31	24	9

**Very high quality of received proposals: 77% above threshold**

# Computing Systems - Analysis (2)

- a) The selected proposals in **target outcome (a)** [multi-core architectures]:
- cover very well embedded computing  
architectures for hard real-time applications; platform architectures for mobile devices; complex multi-core systems based on real-time Java; multi-cores with NoC backbone; dynamically reconfigurable low-power stream processor
  - cover to some extent general-purpose computing  
transactional memory; concurrency in the Instruction Set Architecture
  - do not cover adequately high-performance computing  
due to the limited budget of the objective it was not possible to cover adequately this area
- b) The selected proposals in **target outcome (b)** will develop a reference architecture for embedded systems applicable across a wide range of domains.

# Computing Systems Call 1 Projects\*



\* Subject to contract  
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# Computing Systems Network of Excellence

## NoE HIPEAC

Covers the key aspects of the first target outcome of the Computing Systems objective (architectures, system software, and programming environments)

Continuation of a successful NoE



CHALMERS

FORTH



INRIA



RWTH AACHEN

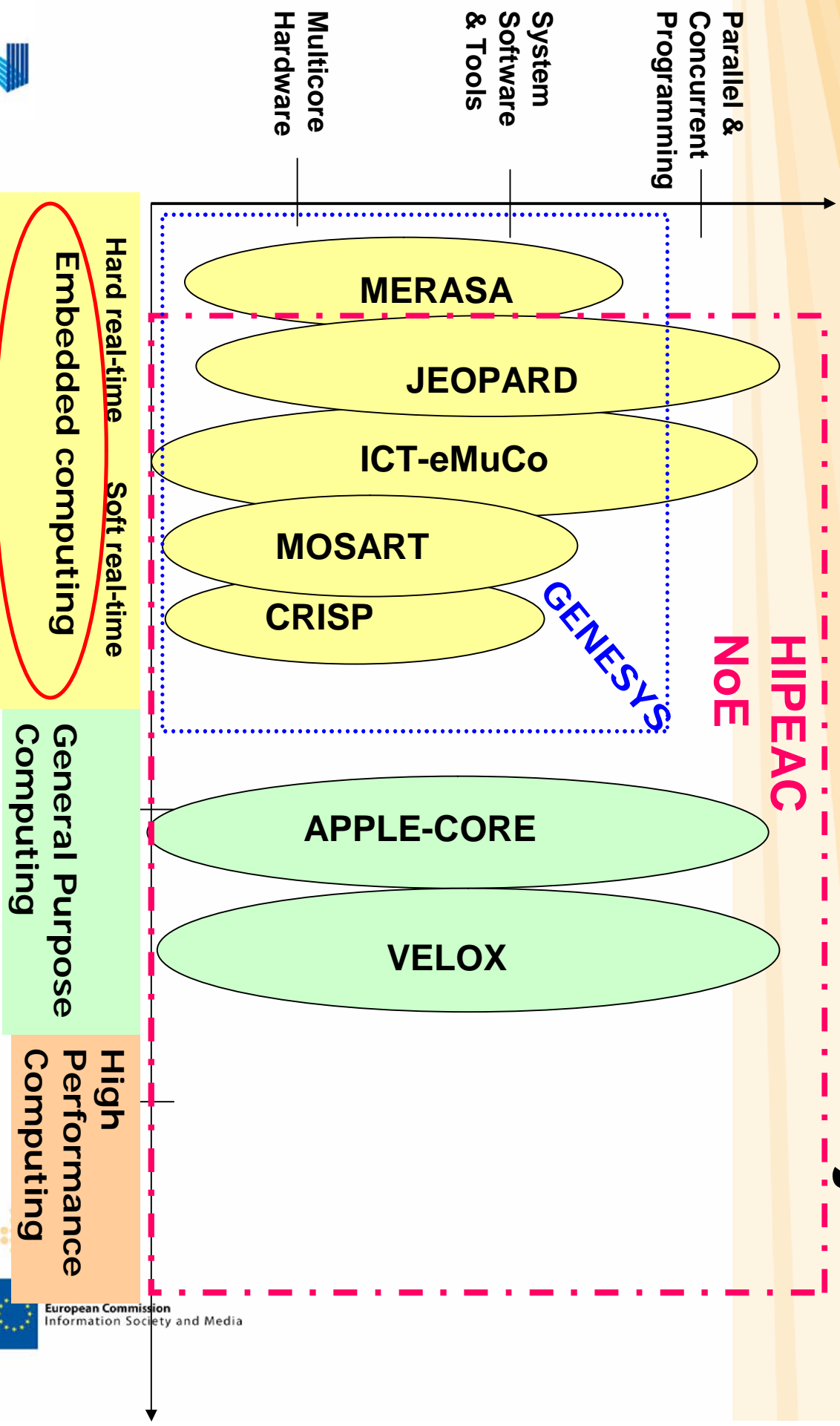
ARM



European Commission  
Information Society and Media

\* Subject to contract

# Computing Systems Call 1 Projects



\* Subject to contract  
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# Embedded Computing projects

## MERASA

- multi-core designs (2-16 cores) for hard real-time embedded applications

## JEOPARD

- Java-based platform independent software development interface for complex real-time multicore systems

# Embedded Computing projects

## ICT-eMuCo

- scalable multicore platform architecture for future mobile devices

## MOSART

- MPSoc with a NOC based communication infrastructure, a distributed memory architecture and configurable cores

# Embedded Computing projects

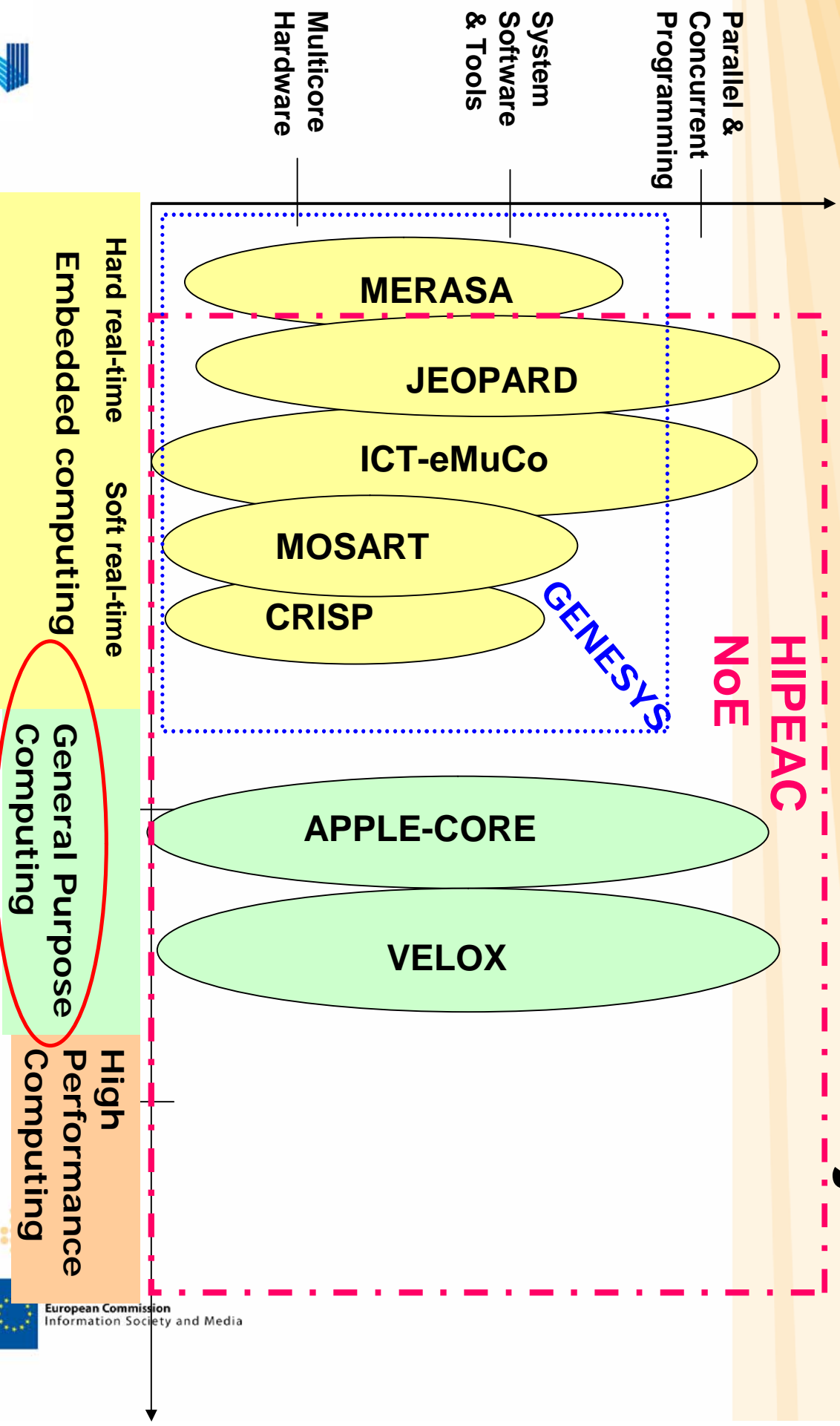
## CRISP

- general-purpose low-power stream processor chip that can be reconfigured dynamically

## GENESYS

- reference architecture for embedded systems applicable across a wide range of domains
- ARTEMIS SRA “Reference Designs and Architecture”

# Computing Systems Call 1 Projects



\* Subject to contract  
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# General-purpose computing projects

VELOX:

- hardware and software support for the transactional memory paradigm

Apple-CORE

- systematic model of concurrency implemented in the Instruction Set Architecture

# Involvement in Computing Systems: Call 1

- The main academic and research institutions are involved
- Industrial players involved:
  - ARM, ST, Infineon, NXP, Thales, AMD Germany, IBM Israel, ...
- SMEs & Startups
  - ACE, ARTERIS, Gaisler, Recore Systems

# Computing Systems

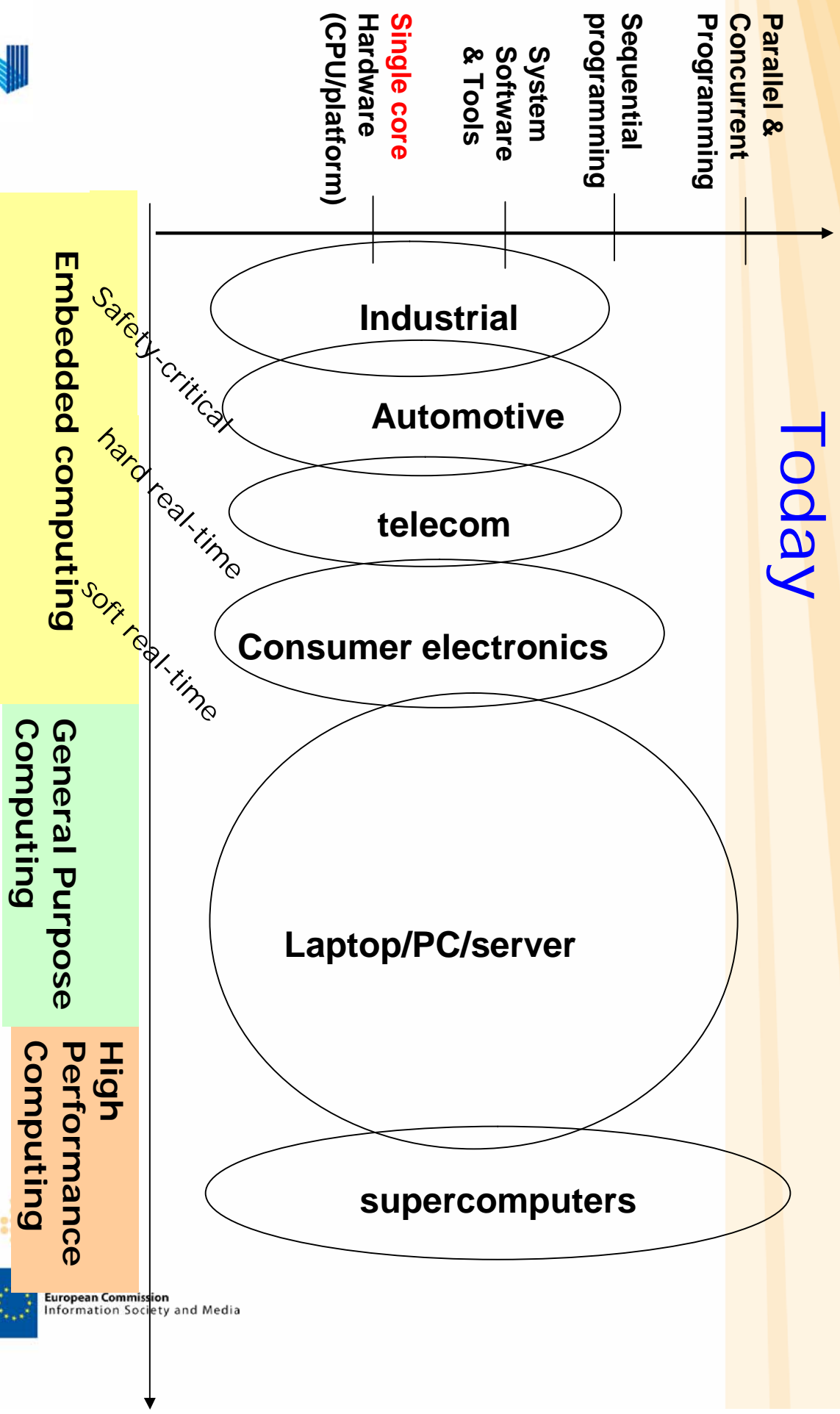
- More details on the selected projects will be on Cordis over the next two months
- Special event in ACM Computing Frontiers Conference, May 2008: European Research in Computing Systems

# Presentation Outline

- Computing Systems: Call 1 Results
- **Computing Systems: Future Prospects**

# Computing is undergoing a radical change

Today



# Computing is undergoing a radical change

Tomorrow

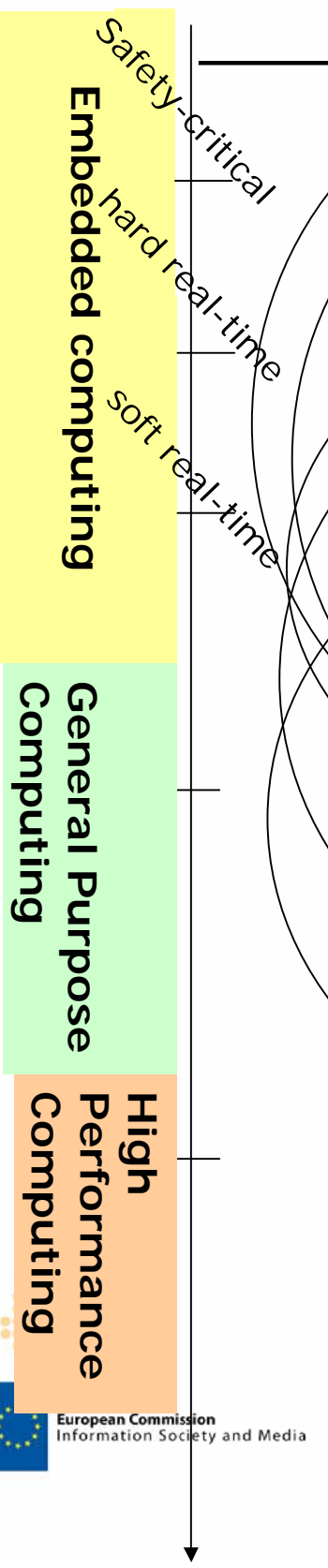
Parallel & Concurrent Programming

Sequential programming

System Software & Tools

Multicore Hardware (CPU/platform)

Cross-cutting challenges are vital



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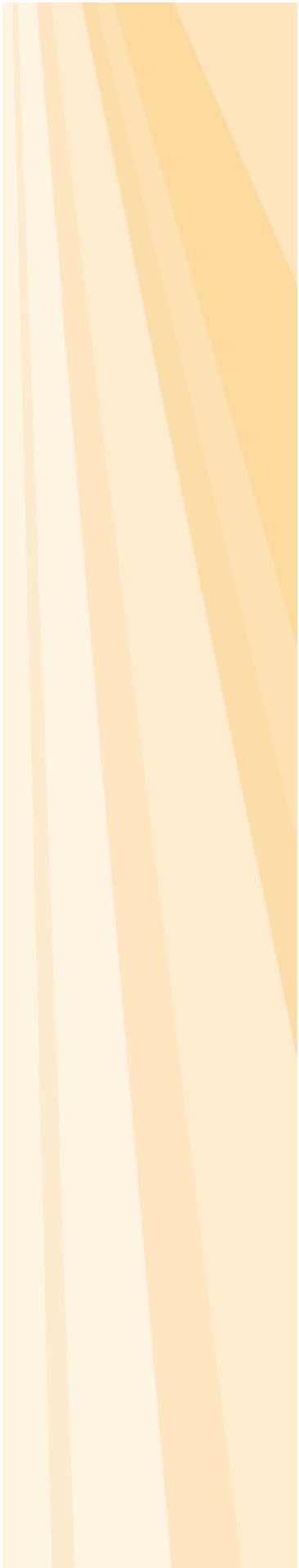


# Computing Systems: next call

- Next Call: End 2008
- The content of the next Call is currently being developed
- Input from:
  - 19 November consultation workshop on Computing Systems
  - 13 December consultation workshop on reconfigurable computing
  - HIPEAC roadmap
  - ARTEMIS SRA

# Computing Systems: next call

- The Call will include challenges according to the following two criteria:
  - **Cross-computing relevance**
  - **Future market relevance**
- Examples of cross-cutting challenges arising from 19 November workshop:
  - Programmability
  - Power efficiency
  - Reliability (taking into account increasing variability)
  - Virtualisation
  - Customisation
  - System modelling and simulation
  - Reconfigurable Computing



Thank you!