SONY

Needs and Trends in Embedded Software Development for Consumer Electronics

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Introduction

- The functions of system LSI become more and more complicated

Current requirement
•Data processing
•Compliant to new formats

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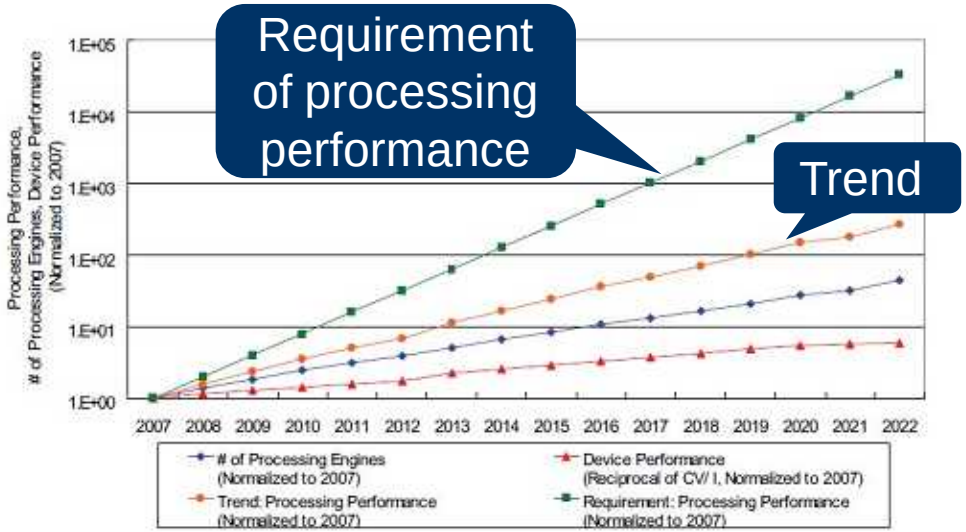
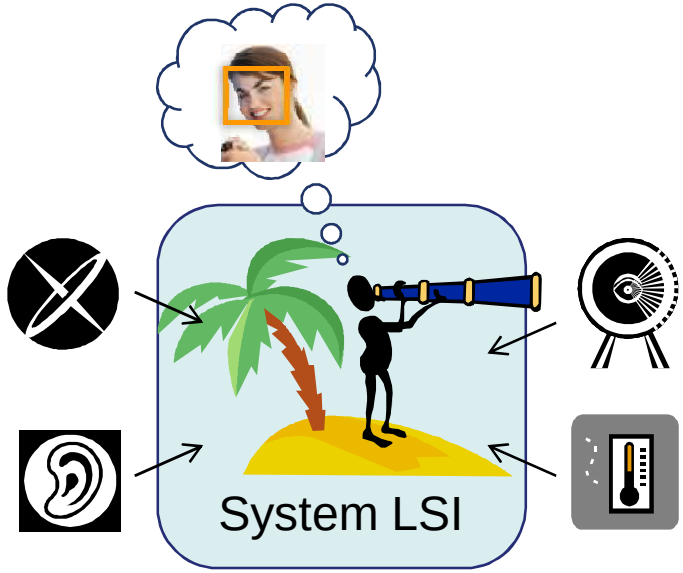
Further expand requirement
•Innovations of the user interface
•Recognizing “outside”



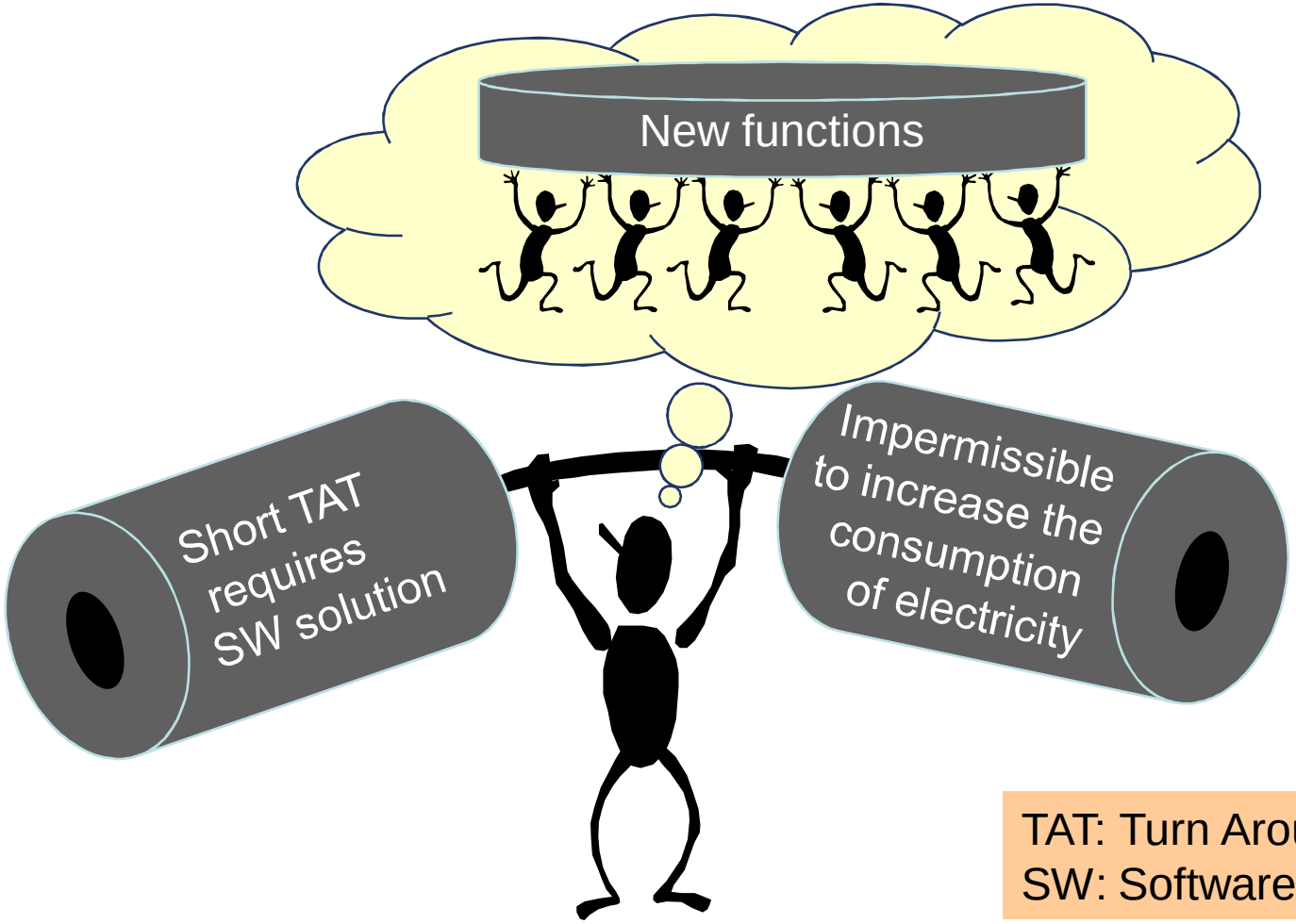
2007 ITRS page 10, Figure SYSD7
SOC Consumer Portable Processing Performance Trends



Ex. Smile detection technology

Introduction (cont.)

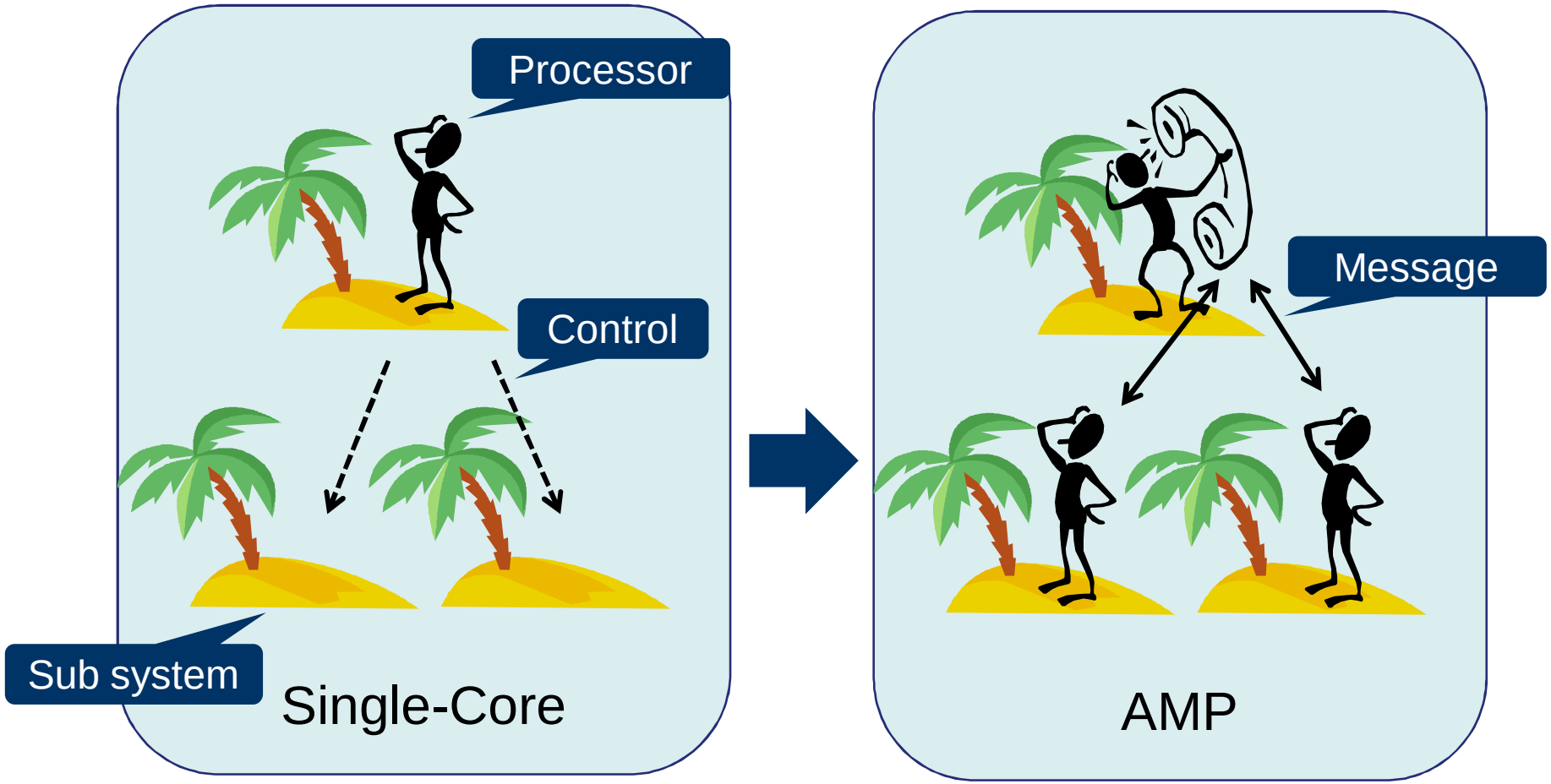
- New functions require increase of # of processors



TAT: Turn Around Time
SW: Software

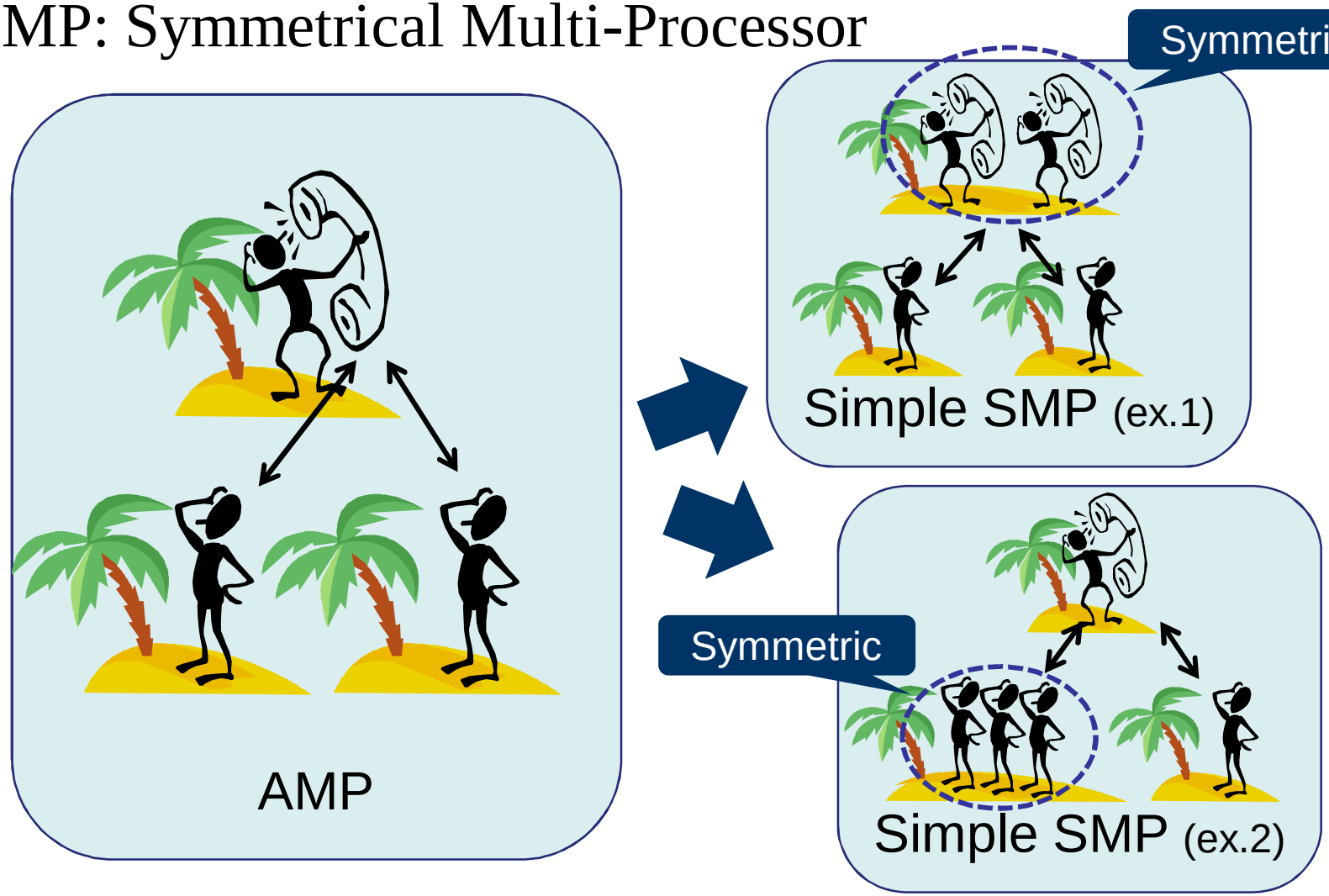
Directionality of the system LSI architecture

- AMP: Asynchronous Multi-Processor



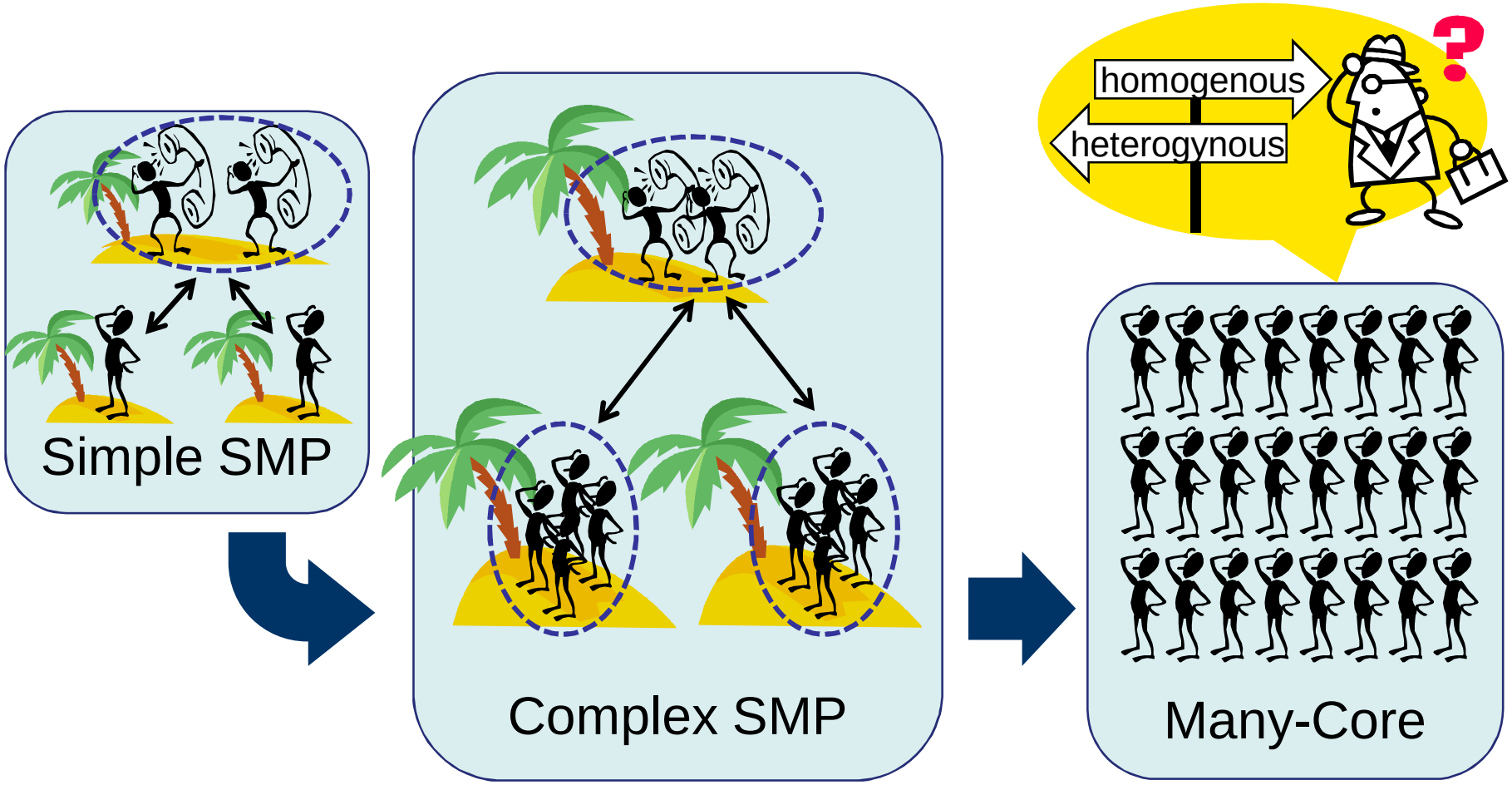
Directionality of the system LSI architecture (cont.)

- SMP: Symmetrical Multi-Processor



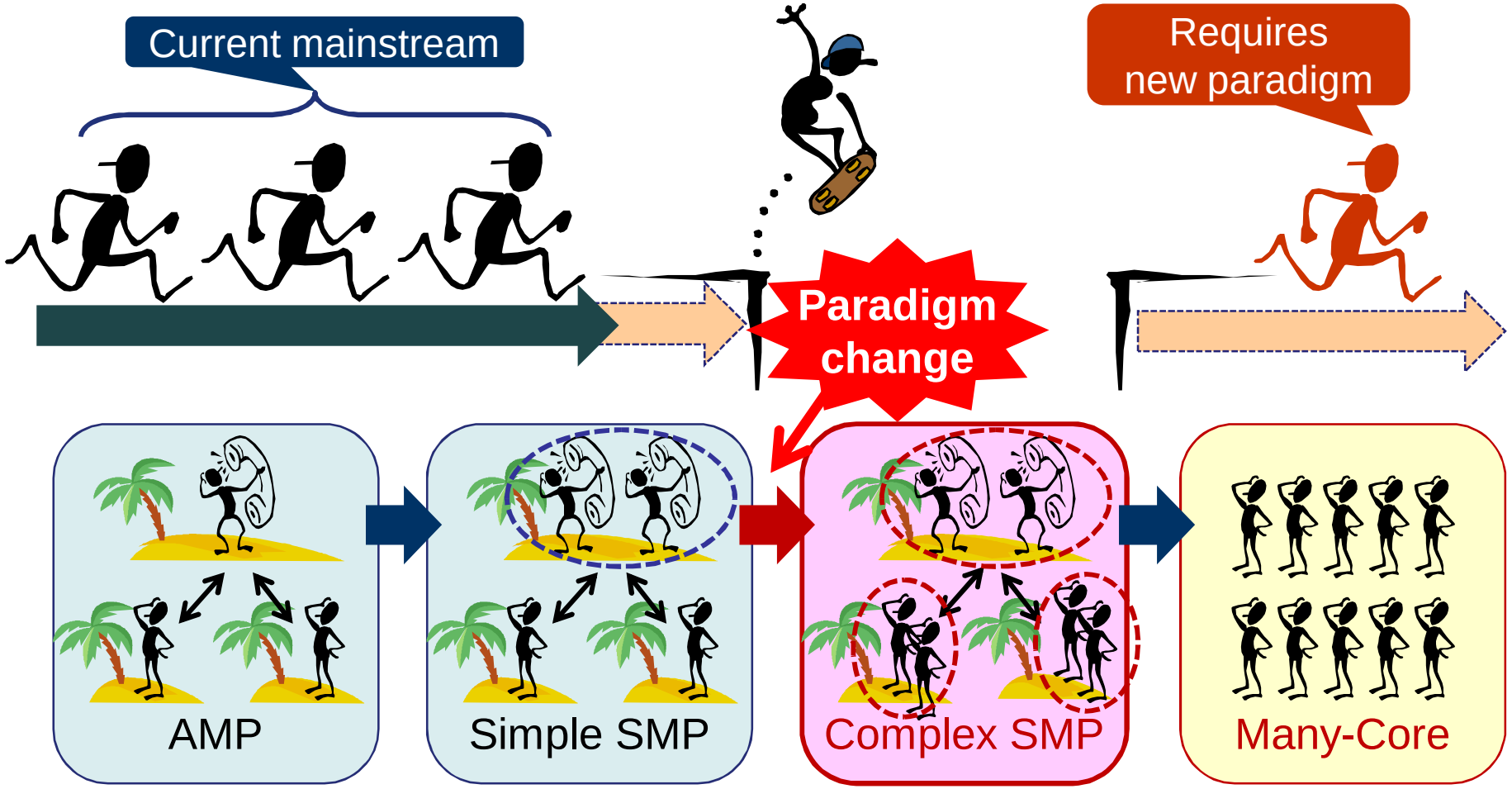
Directionality of the system LSI architecture (cont.)

- Complex SMP and Many-Core



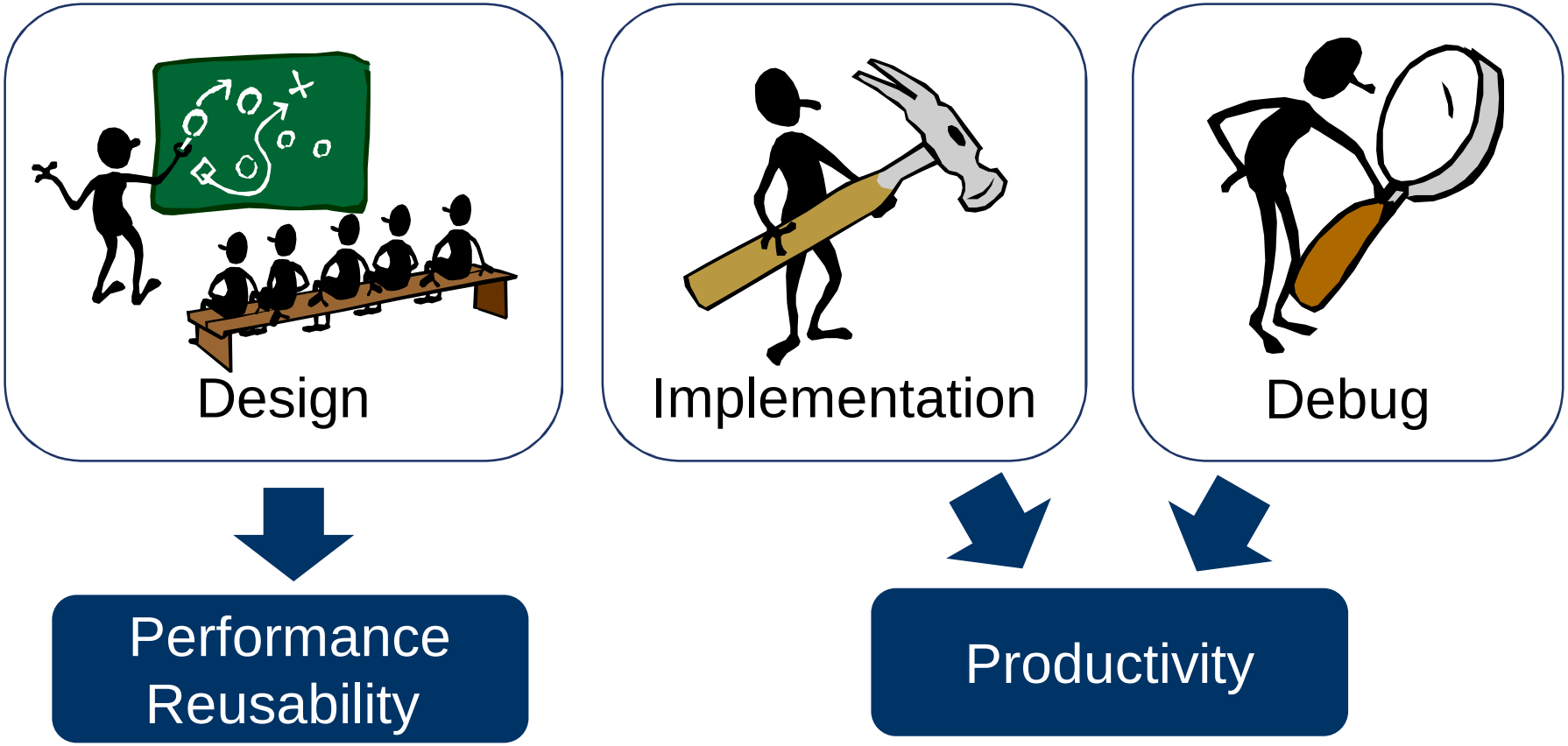
When and how does the software change?

- It will happen when complex SMP is introduced into



Problems of mass-producing Many-Core SW

- Problem area: design, implementation & debug



List of problems

A) The design issues

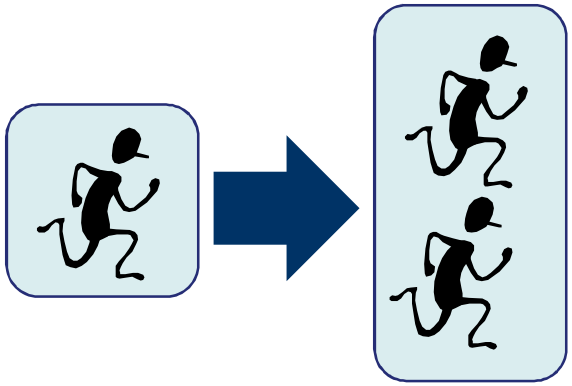
- Finding out the part which cannot parallelize and replace
- Increasing maximum parallel degree of the algorithm
- Increasing self-propelled periods
- Optimizing access to the hierarchy memory

B) The implementation and debugging issues

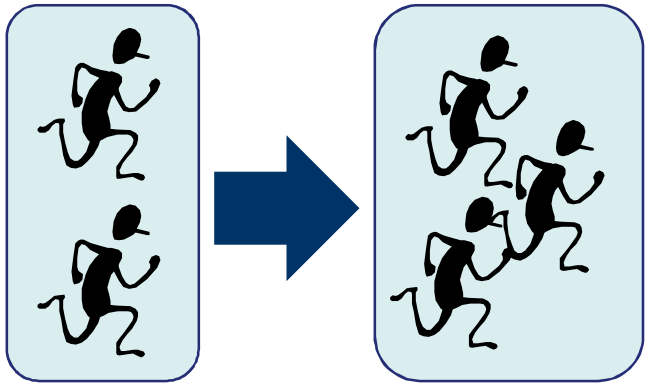
- Increase of the fault due to the programming difficulty
  - The faults due to an omission of consideration of the parallel movement
  - The deadline passes to rarely occur by disturbance
  - The communication between one SMP and the other SMP

- Increase of the difficulty of the debugging work itself
  - Observing the behavior of multiple processors at the same time
  - Divergence between a source code and an execution object
  - The debugging of multiple programming languages

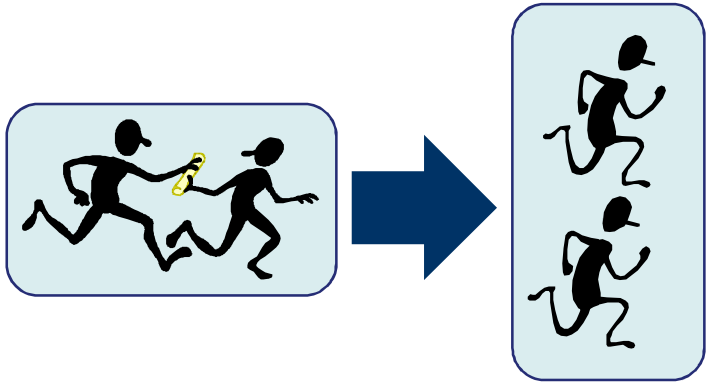
Design issues (performance and reusability)



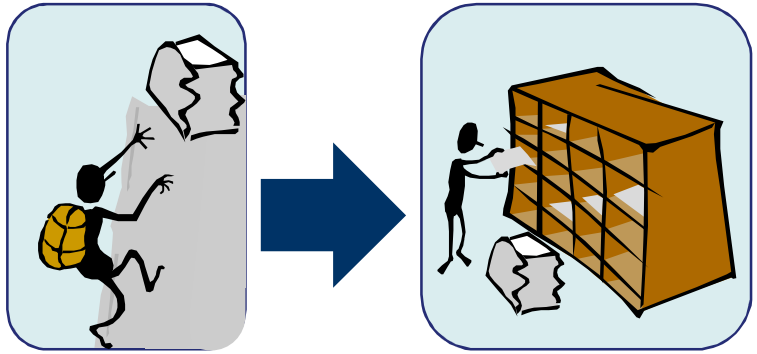
Replace to parallelizable



Increase max parallel degree



Increase self-propelled periods

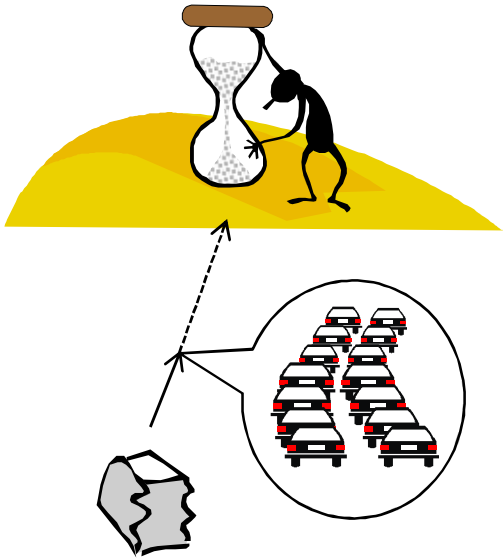


Optimize hierarchy memory access

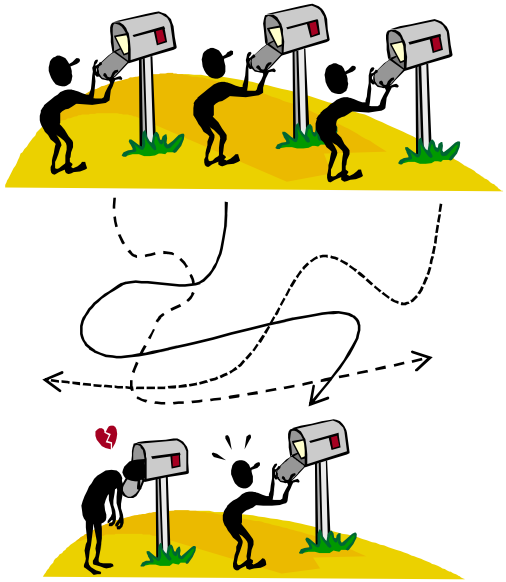
Implementation & debugging issues (productivity)

- Increase of the fault due to the programming difficulty

Parallel movement



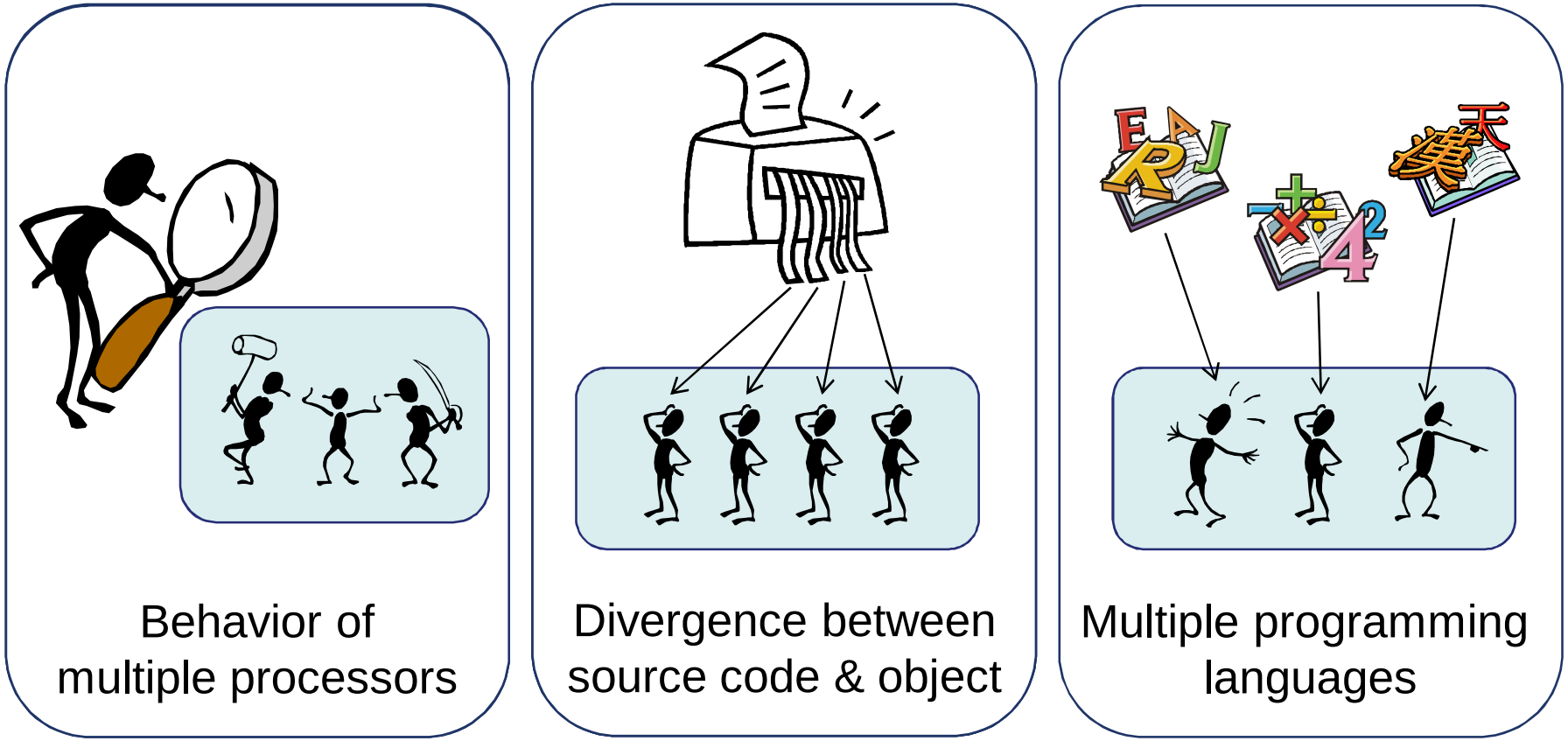
Disturbance



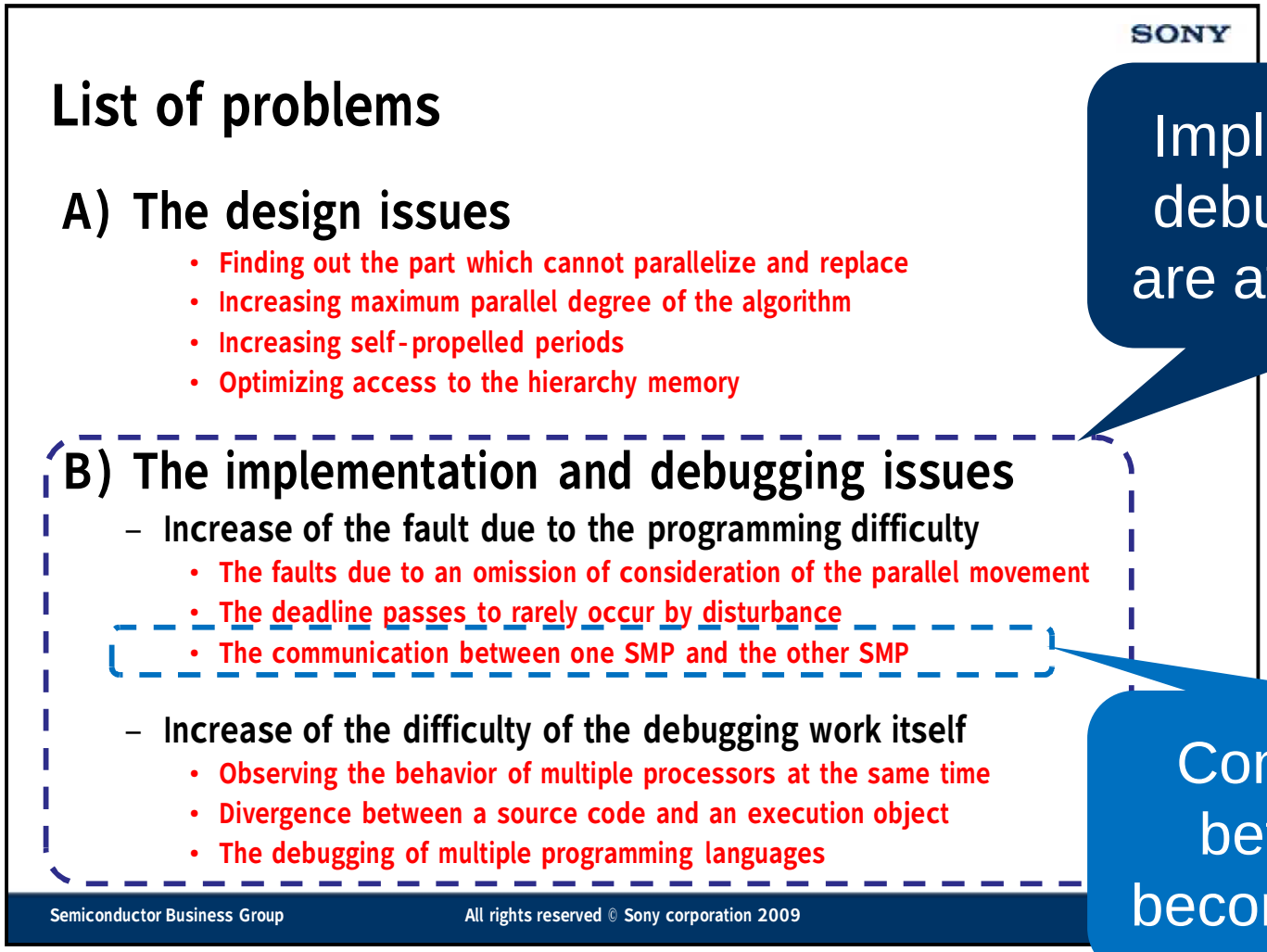
Communication between SMP

Implementation & debugging issues (productivity)

- Increase of the difficulty of the debugging work itself



Character of the issues from math production

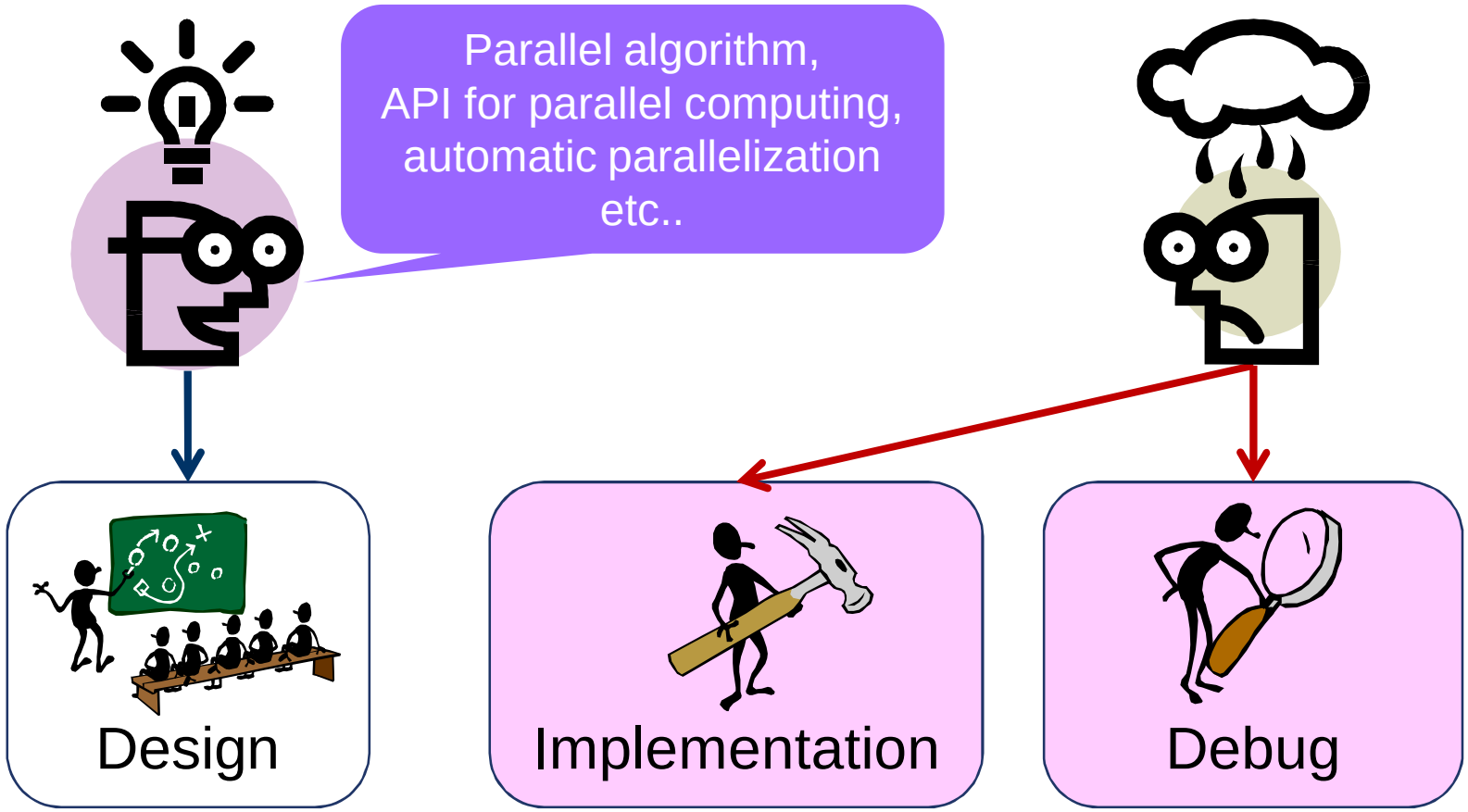


Implementation & debugging issues are at the fore front

Communication between SMP becomes important

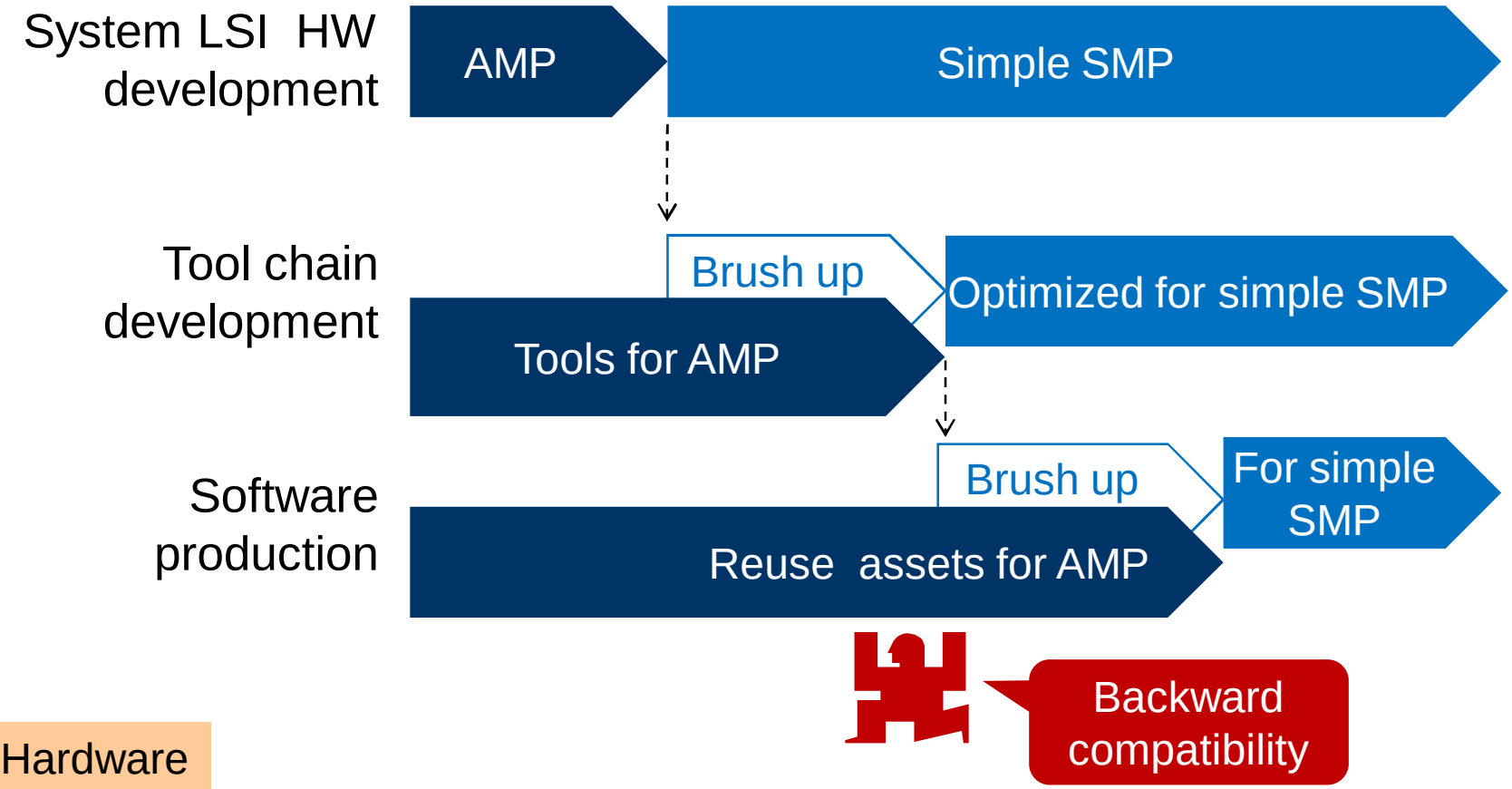
Status of the efforts to solve these issues

- The challenge of the productivity is late considerably



Adoption of software takes a few years

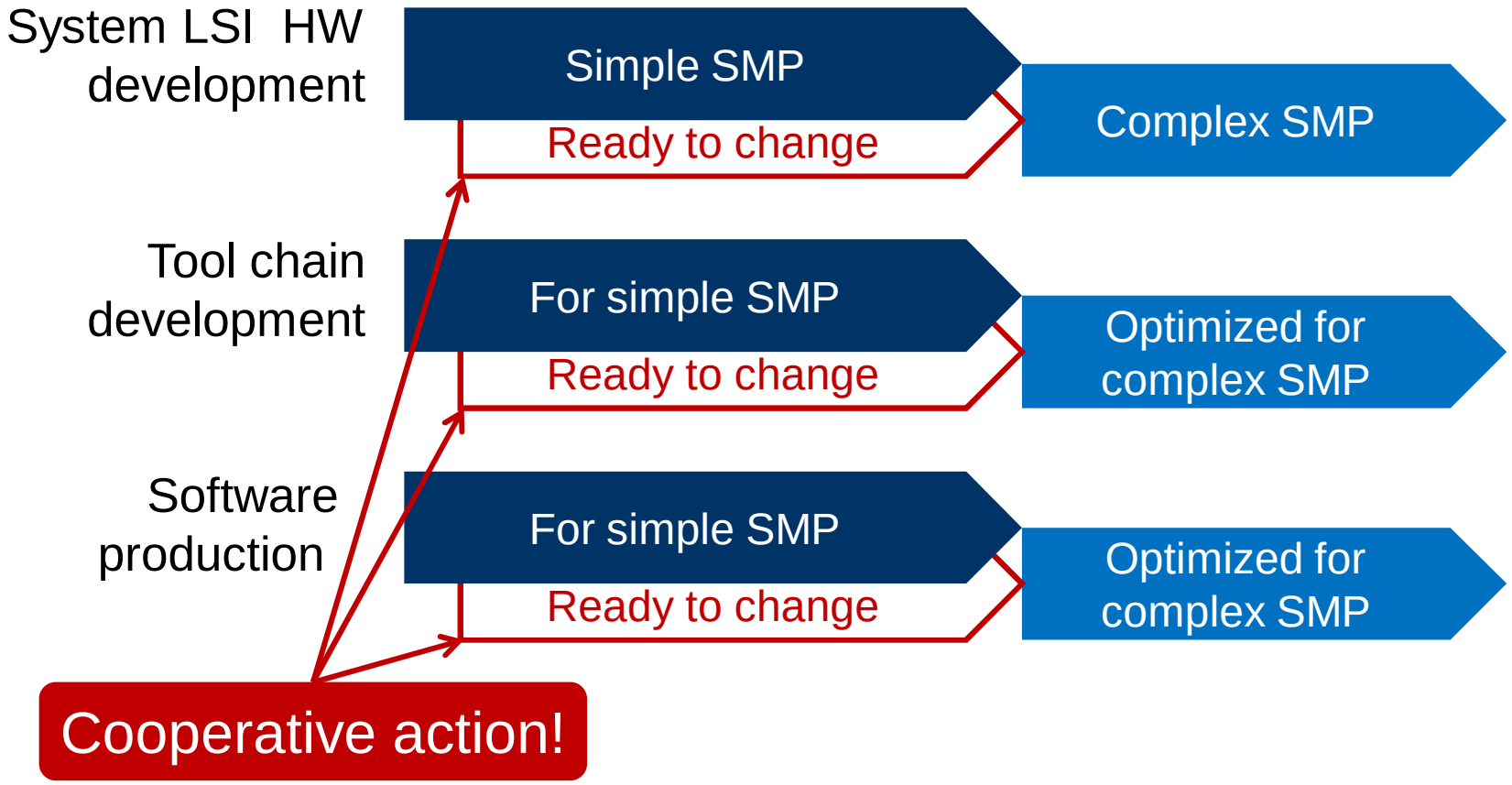
- Backward compatibility covered the time lag



HW: Hardware

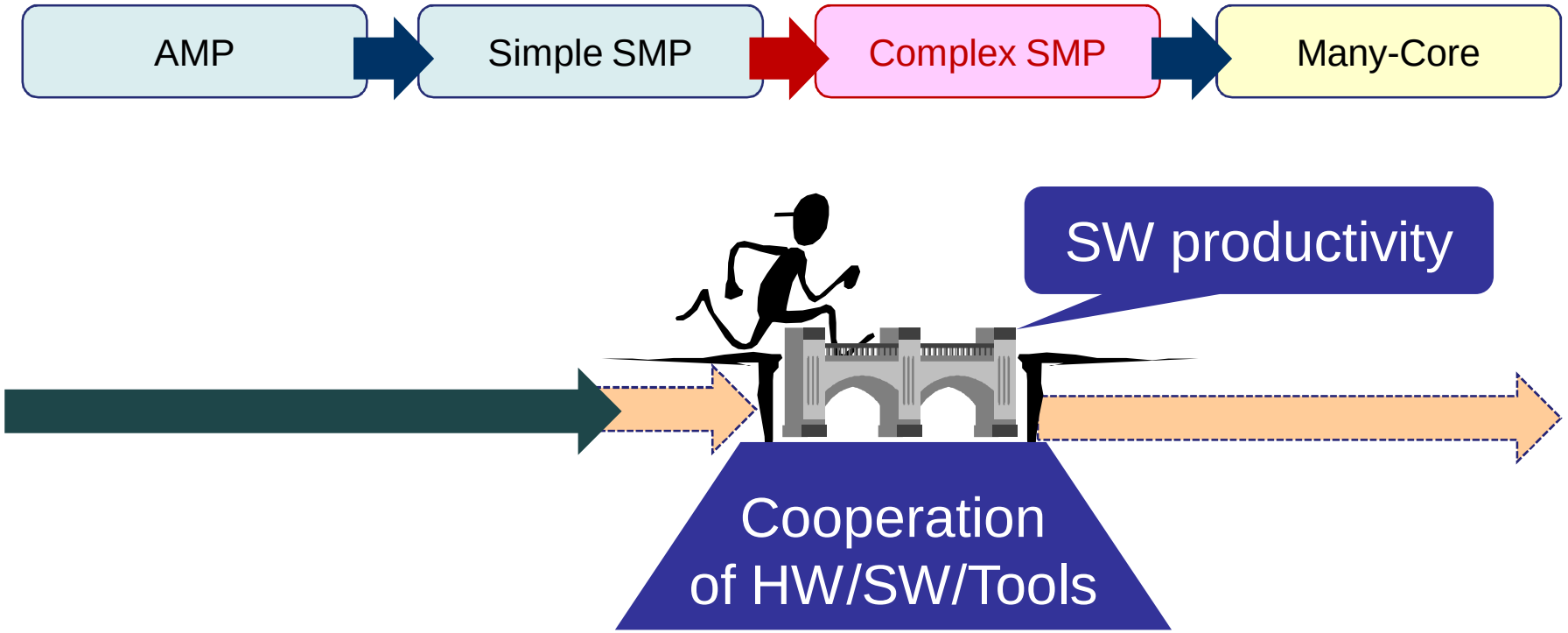
Next step requires both HW and SW change!

- HW, SW & tools have to tackle it in a cooperative way!



Conclusion

- Shift to the Many-Core depends on the SW productivity
- It requires cooperation among HW, SW & tools



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Q&A