

Electronic Design Automation- The Next 50 Years

Overview

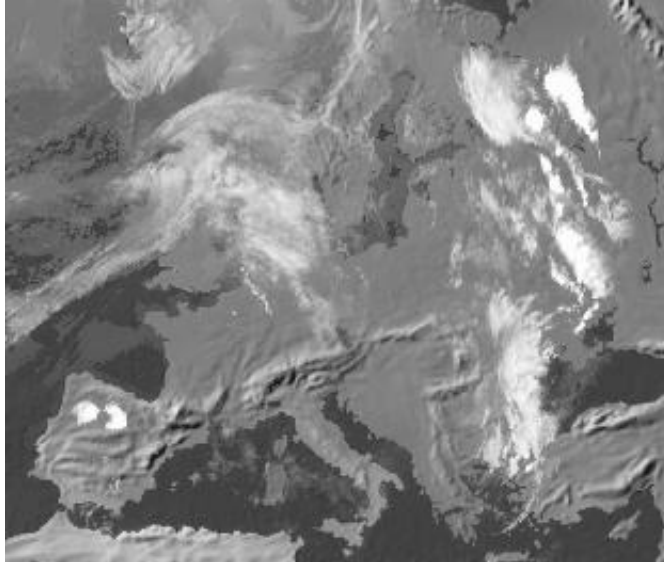
- Axel Jantsch, Royal Institute of Technology, Stockholm, Sweden
- Why can it be predicted ?
 - Patterns and Trends
 - System design in 2050



Assumptions

- Design automation technology keeps developing
- Demand for applications keeps developing
- The economics allow the development and production of the demanded applications

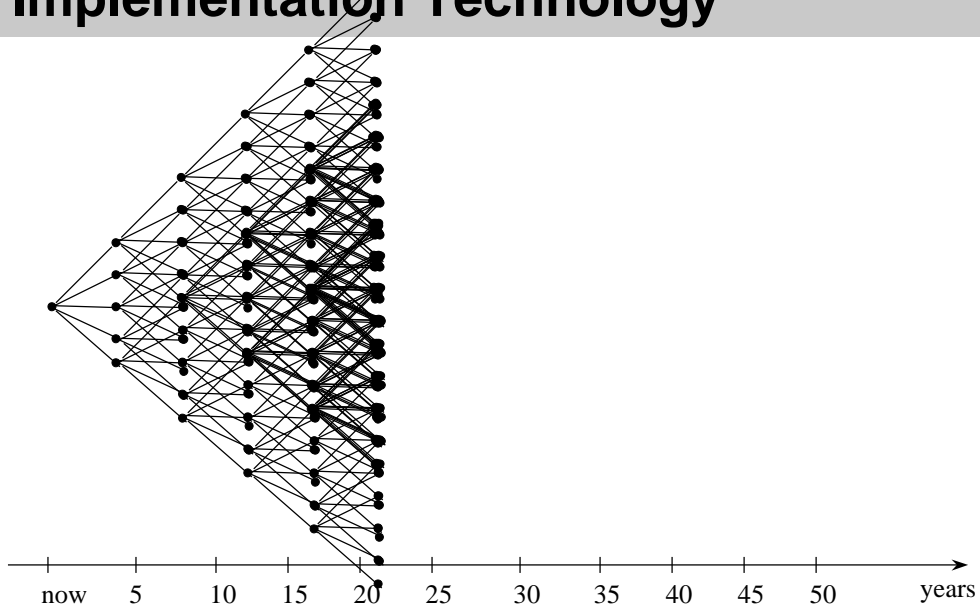
Is the Evolution of EDA Predictable?



Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001 3

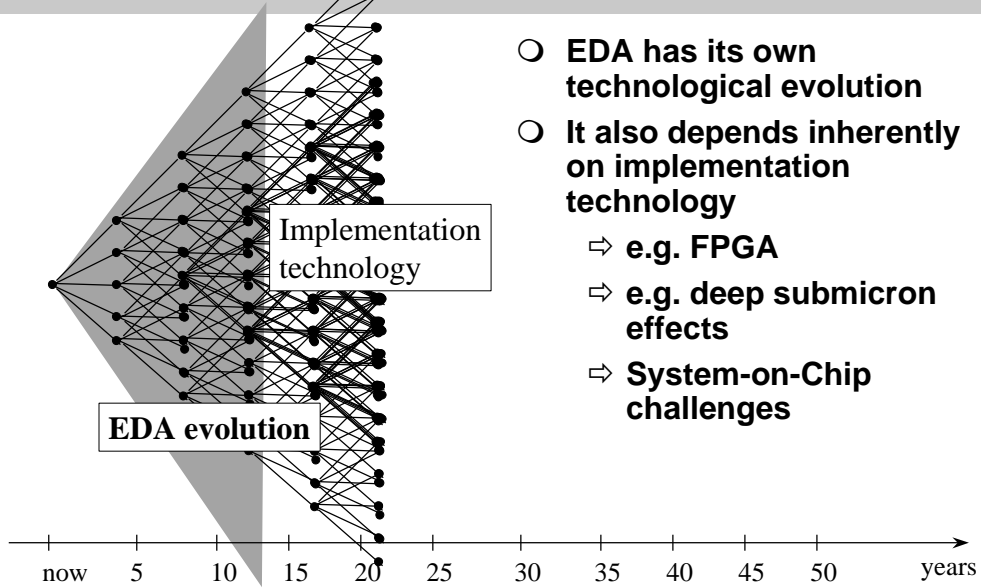
Implementation Technology



Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001 4

EDA Evolution

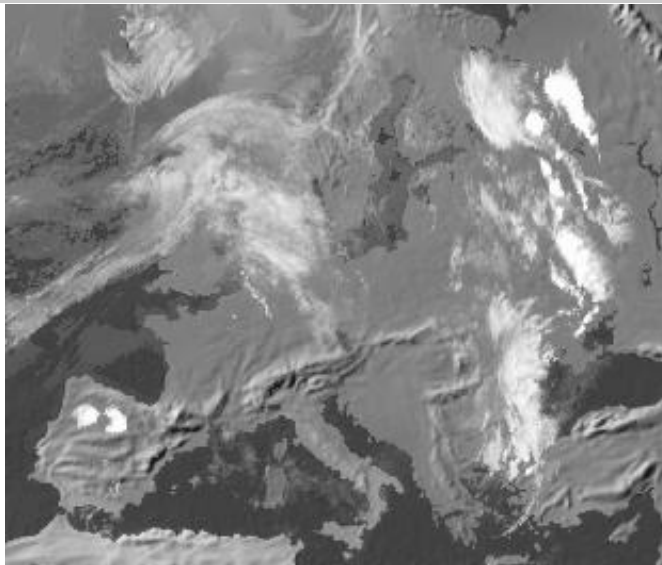


- EDA has its own technological evolution
- It also depends inherently on implementation technology
 - ⇒ e.g. FPGA
 - ⇒ e.g. deep submicron effects
 - ⇒ System-on-Chip challenges

Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001 5

Weather Forecast revisited



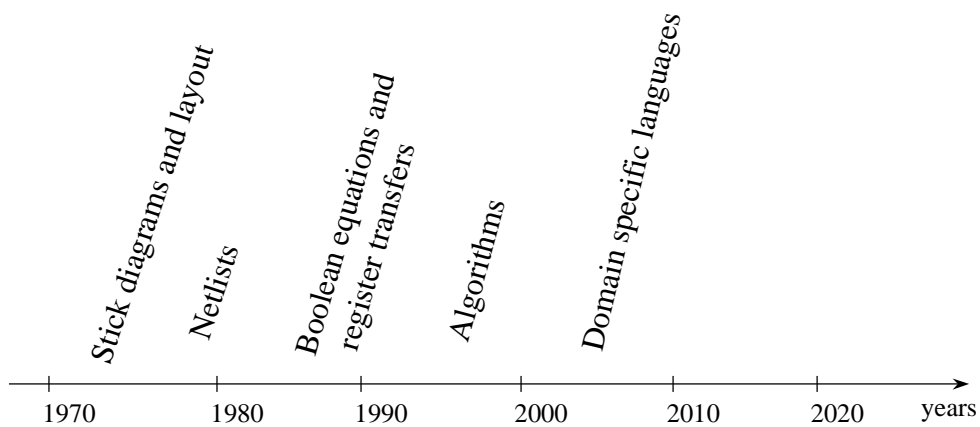
Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001 6

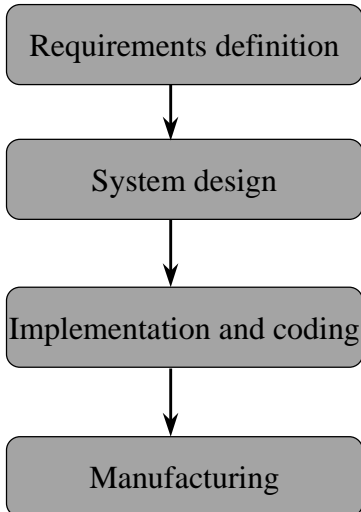
Patterns and Trends in EDA

- Design entry moves towards application concepts
- Design methodologies are organized in layers
- A strong need for automation
- Well understood steps can always be automated

EDA Entry Moves towards Applications



Layers of Design Methodologies



Design is organized in layers for 2 reasons:

- To handle complexity
- To reuse

- FPGAs ?
- Deep submicron effects?
- System-on-Chip challenges?

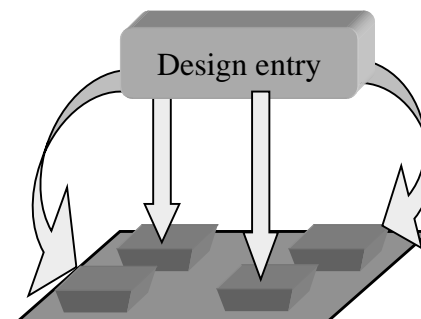
Degree of Automation Increases

A design task is automated whenever possible because

- It is faster
- It is cheaper
- It is more reliable

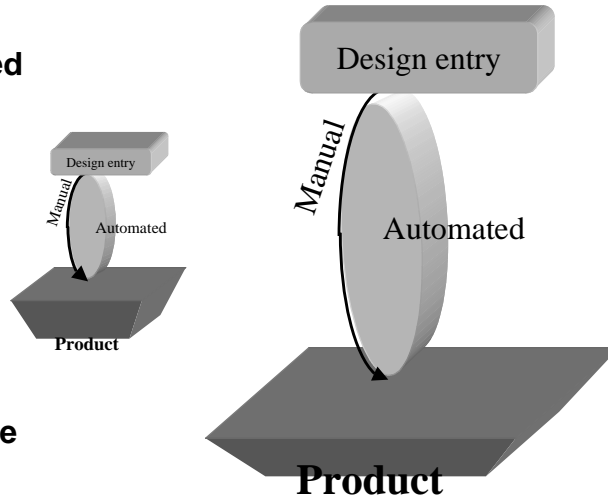
○ Types of automation:

- ⇒ Synthesis
- ⇒ Reuse



The Price of Automation

- Well understood tasks can always be automated
- Automation always comes at a price
 - + Design process is fast
 - + Design process is cheap
 - + Design process is reliable
 - Product is expensive
 - Product is slow
 - Product is not optimal



Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001

11

Product Development in 2050

- Design entry is based on functionality seen by the user
- Marketing people and users are “system designers”
- Time from idea to market is 1 month
- Complete automation from design entry to manufacturing
- The design process is very stable except “hot spots”
- The design process is mostly independent of implementation technology
- Human designers will do:
 - ⇒ Optimize critical parts
 - ⇒ Support and develop the design process
 - ⇒ Accommodate changing implementation technology

Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001

12

Example Product Development

Product manager



+

For Kids 6-10 years

- Pure voice, no data, no web
- Local phone calls only
- 5 emergency numbers
- Reliable voice recognition
- Toy like shape and colours
- Can be located
- Robust
- Cheap

+



+



**Pockephone
(50 kr)**

Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001 13

Product Development

Add system functions
and services (IPs)

System estimation

Synthesize interfaces
and overall control

Detailed estimation

Manufacturing

- System functions and services are future Intellectual Property blocks (IPs).
- IPs are described in standardized notations allowing mixing, interfacing synthesis, and validation.
- Trade-offs are done in terms of system level functionality, cost and performance factors.

Axel Jantsch
Royal Institute of Technology, Stockholm

June 6, 2001 14

Summary - Main Conclusion

- Long term trends:
 - ⇒ “Design entry” moves towards applications
 - ⇒ Layered methodologies shield against impacts from implementation technology
 - ⇒ There is both a demand for and possibility of automation
- The overall design methodology will mature and stabilize
- System design will depend less on implementation technology
- The EDA tool chains and design methodologies will only evolve and “grow” over the decades

Summary - System Design in 2050

- Product managers and end users will be system designers
- “Design entry” will be based on configuration of end user functions
- The design and synthesis tasks will essentially be the integration of functionality modules and system features