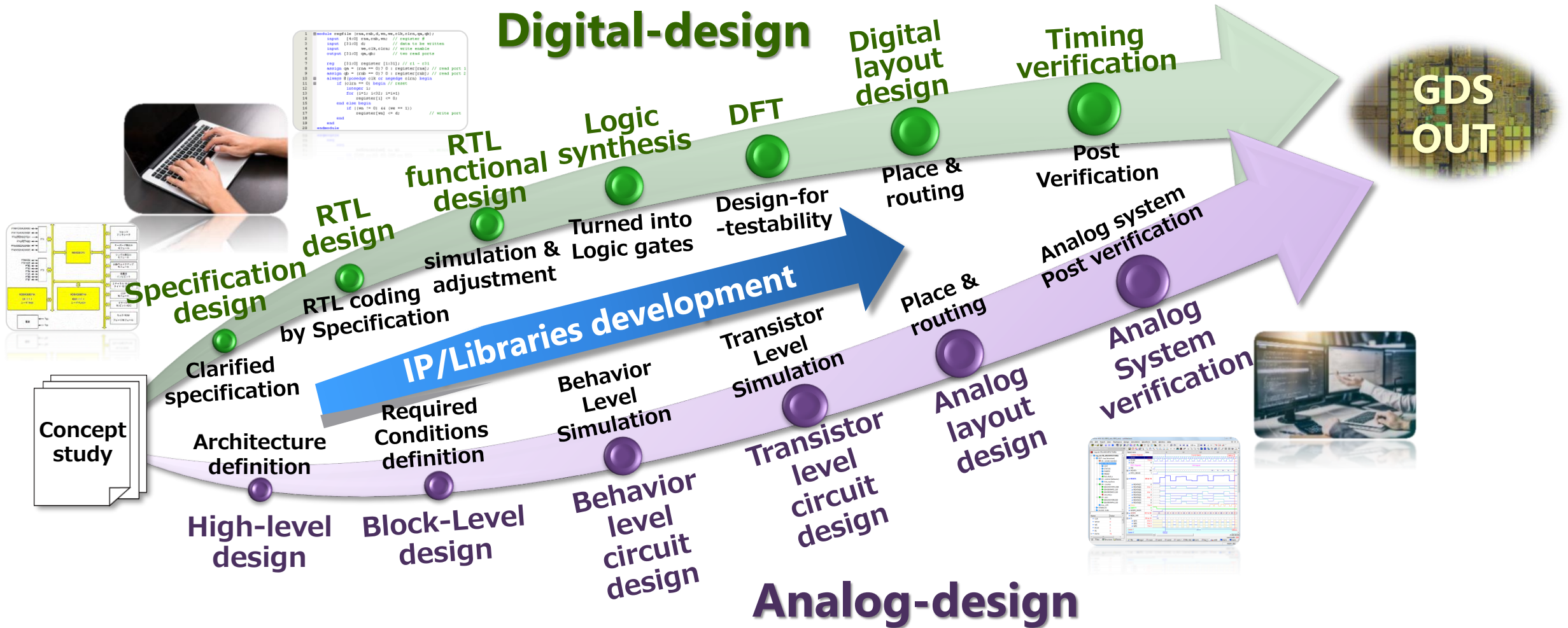# Design Services   -LSI design development flow-

LSI design and IP/libraries development

▶LSI design development flow

Digital-design

IP/Libraries development

Analog-design

Concept study

- Clarified specification — Specification design
- RTL coding by Specification — RTL design
- simulation & adjustment — RTL functional design
- Turned into Logic gates — Logic synthesis
- Design-for-testability — DFT
- Place & routing — Digital layout design
- Post Verification — Timing verification

- Architecture definition — High-level design
- Required Conditions definition — Block-Level design
- Behavior Level Simulation — Behavior level circuit design
- Transistor Level Simulation — Transistor level circuit design
- Place & routing — Analog layout design
- Analog system Post verification — Analog System verification

GDS OUT

Design development　(LSI products)

LSI design and IP/libraries development

▶Digital design engineering

◆Proposals for design development flows and design engineering of LSI products
Entire processes from specifications design to implementation are supported by abundant LSI development expertise cultivated as IDM[*1] .
Latest design method and know-how contribute to designs development with short TAT.
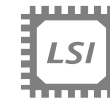
◆LSI development results

Development results
Abundant development results by fabrication, advanced process, VLSI, and high frequency

・Fabrication　SEC[*2],TSMC[*3], UMC[*4], GF[*5],
　　　　　　　　and JSC[*6]

・Process　　　To 5 nm
・Scale　　　　150 Mgates
・Frequency　　1GHz

Abundant LSI development results

Image processing

Micro controllers
(Arm®/DSP)

MFPs
(Control chips)

Road traffic system
(Automotive LSIs)

Memory cards
(Internal bridge circuits)

Image sensors
(Image processing control)

Design development (LSI products)

▶Analog design engineering

◆Libraries development results

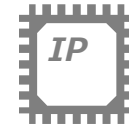| Process support results |
|---|
| Abundant results by fabrication and advanced process |

·Fabrication   SEC[*1],TSMC[*2], UMC[*3],
                        and JSC[*4] (CMOS, CD, BiCD)

·Process   To 16nm
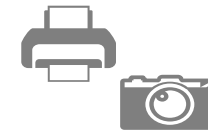·Related products SoC, ASIC, linear sensors, area sensors

Abundant development results
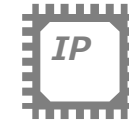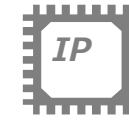

Automotive products

IPs for microcontrollers

Consumer MCDs

IPs for RF (high frequency)

Memory cards

GPIO,PLL Oscillators, ADC, and DAC