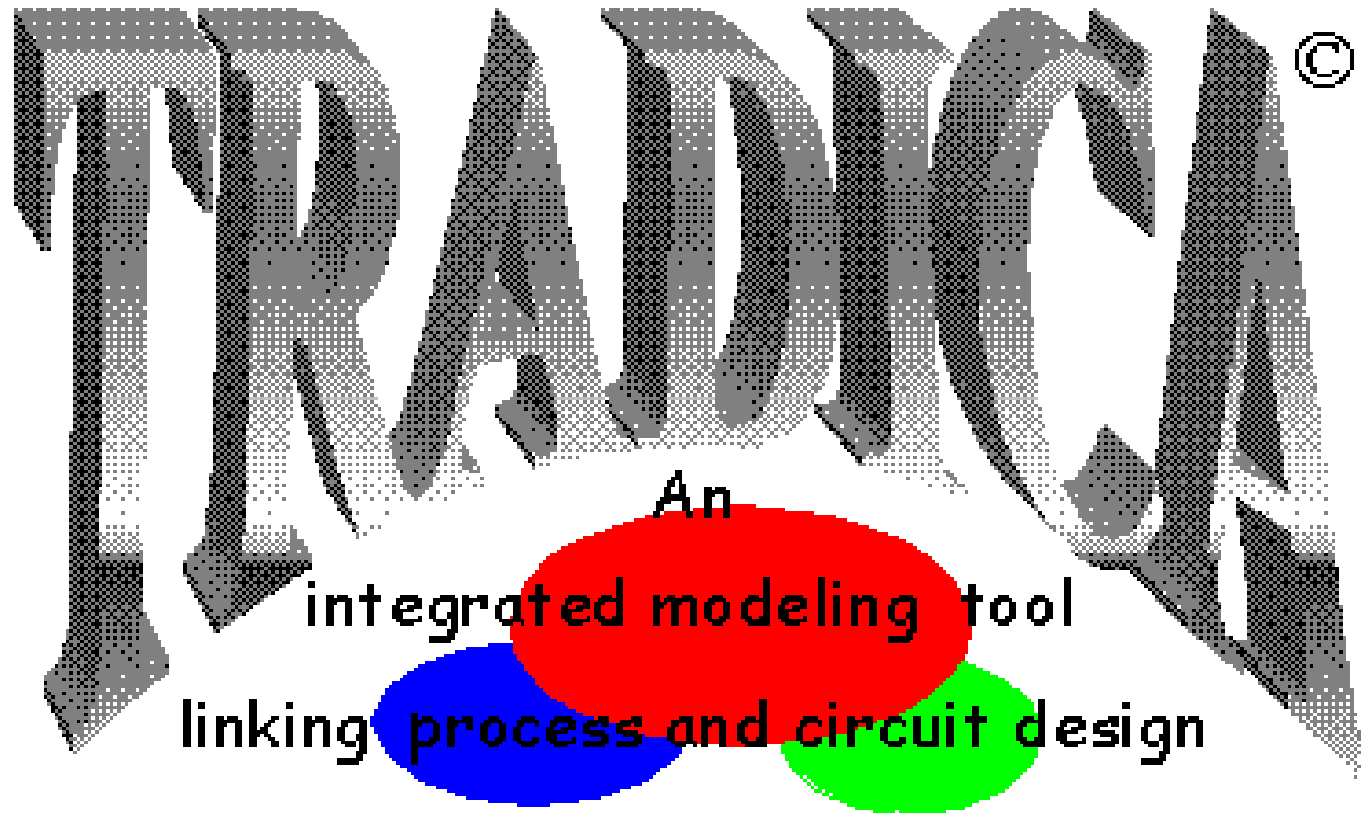




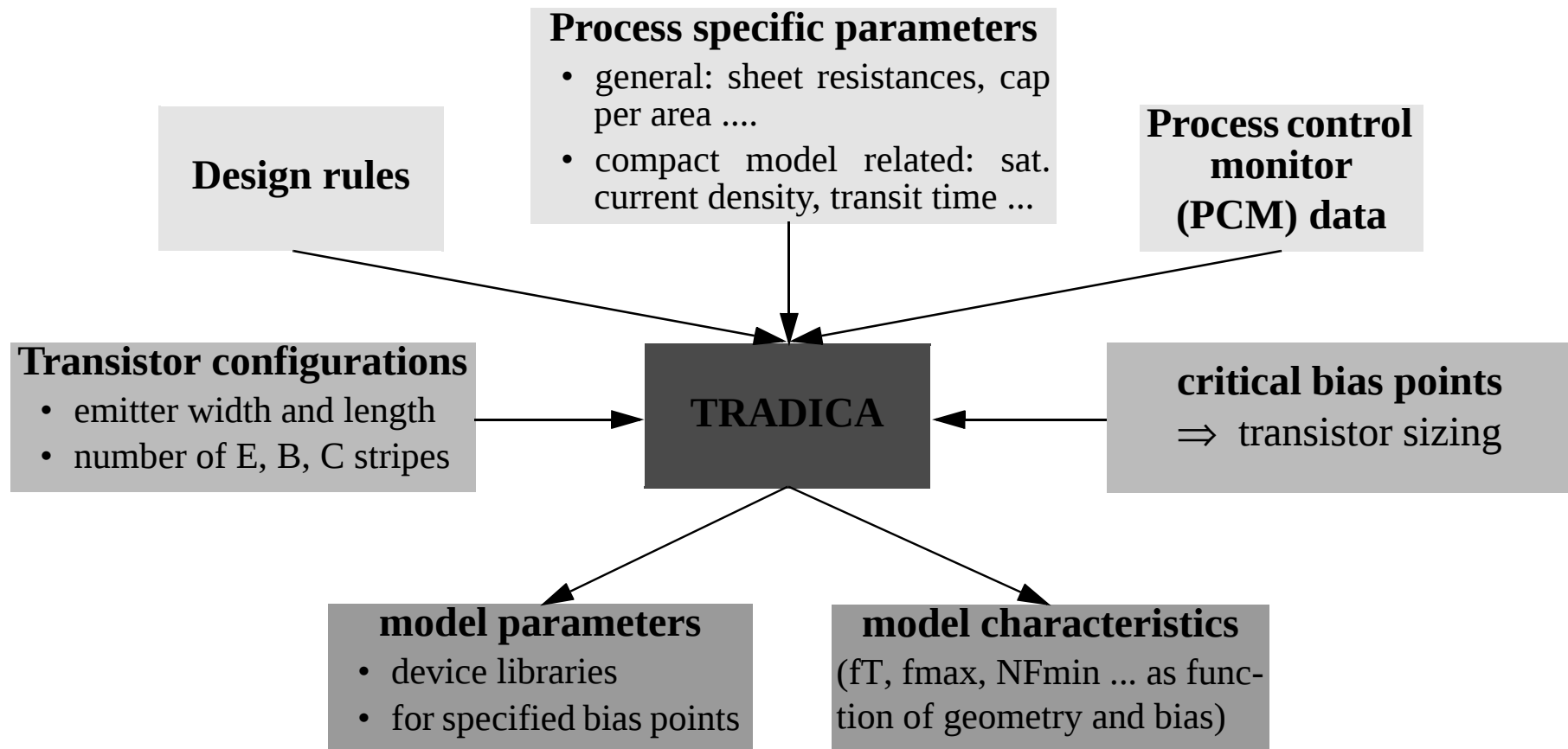
Physics- and process-based bipolar transistor modeling for integrated circuit design

Motivation

- Increasing demand on circuit performance → often requires transistor operation close to the process performance limit ⇒ design measures:
 - careful circuit optimization through proper transistor sizing
 - process variations need to be included
- Large variety of circuit applications → overall required number of transistor configurations¹ can become very large (>100) ⇒ need geometry scalable compact models
- Reduce time-to-market: start circuit design during process development (*concurrent engineering*) ⇒ predicted but consistent model parameters and flexible parameter generation
- Align process development with product (design) needs ⇒ quick evaluation of process change impact on electrical device and circuit performance
- Include process tolerances in design:
 - statistical modeling
 - matching

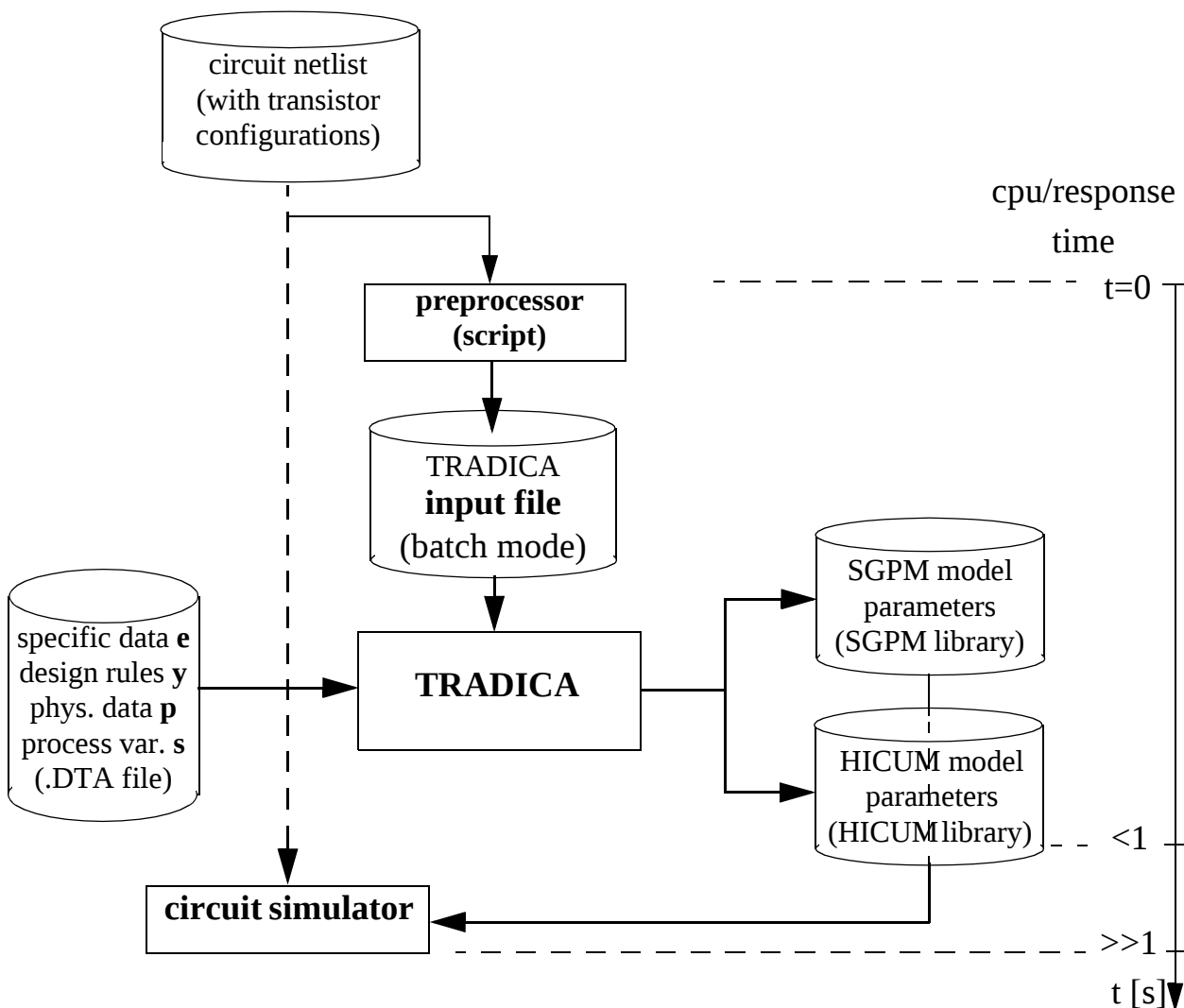
1. defined by emitter dimensions b_{E0} and l_{E0} ($\geq b_{E0}$), number of emitter, base, and collector fingers/contacts and their spatial arrangement

TRADICA overview



Integration of TRADICA in RF design system

- Benefits:
 - circuit optimization via consistently scalable transistor models
 - statistical and matching simulation
 - parameter transfer via single "technology" file (xxxx.DTA)
 - ⇒ significant enhancement of functionality for design at reduced maintenance effort for foundry
- Integration scheme:



Program features

- Generation of consistent sets of geometry scalable compact model parameters for
 - HICUM
 - SGPMfor each: hierarchy of equivalent circuits with different complexity
- Statistical modeling capability
 - generation of skewed model parameter sets
 - determination of corner-case parameter sets
- Transistor sizing
- Automatic extraction of specific SGPM parameters from specific HICUM parameters
- General features:
 - user friendly interactive operation
 - batch operation (for integration in extraction and design systems)
 - Manual and installation guide available
 - platforms: UNIX, Windows

Distribution list

Agere
Alcatel
Alpha (formerly Conexant's III-V division)
Atmel
Conexant
Cypress
IBM
IIT
Infineon
Jazz
Maxim
SiliconWave
STMicroelectronics