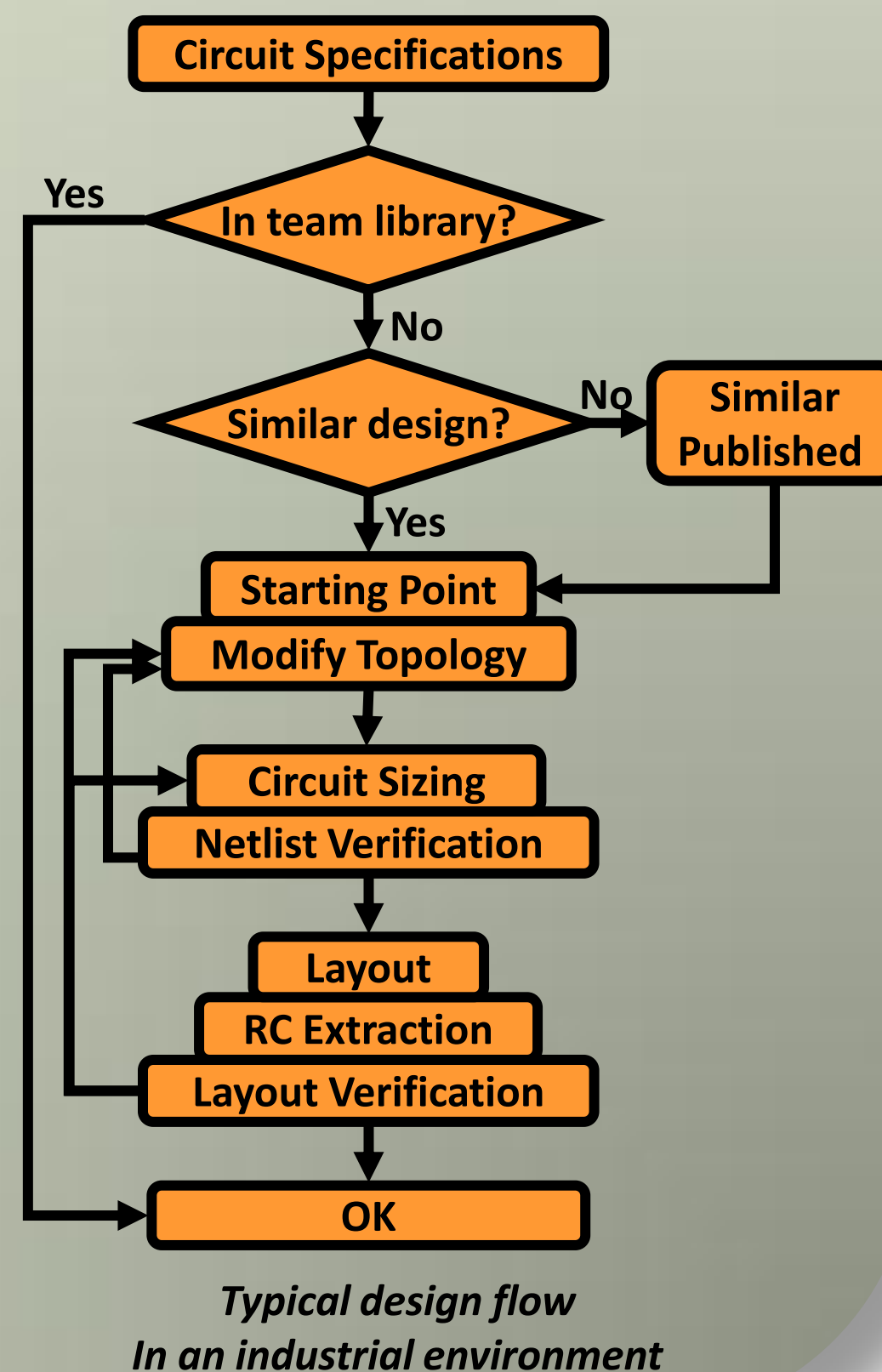


Analog Design Automation: An Industrial Perspective

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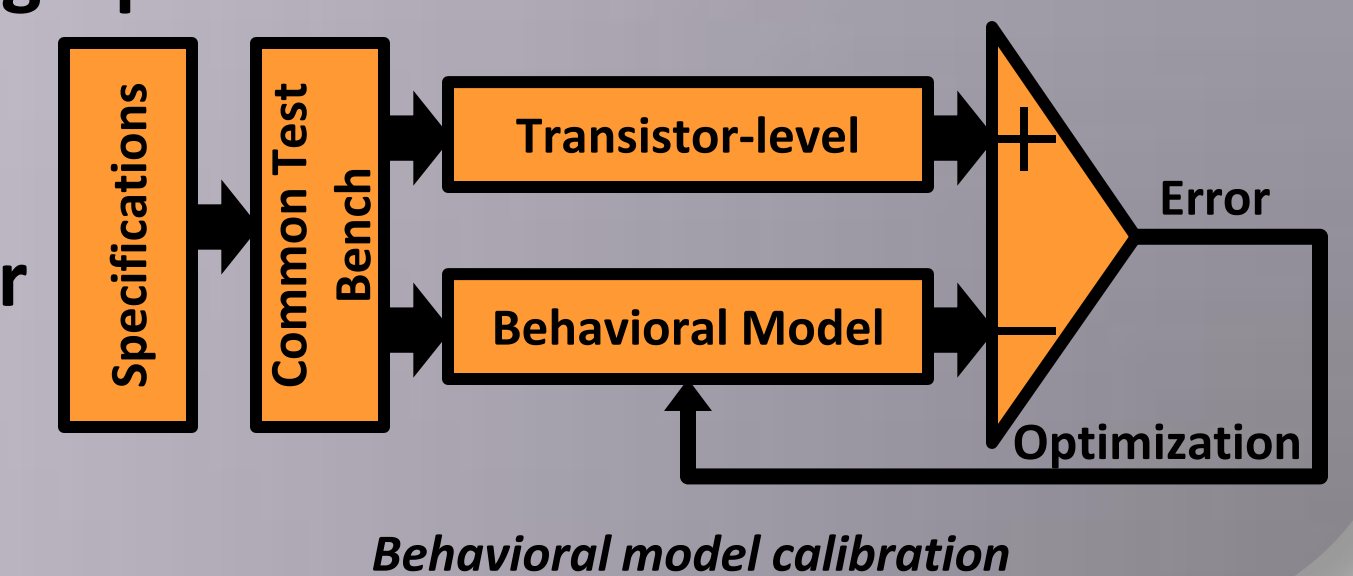
What does an analog designer want?

- Innovate new architectures → Only Spice!!
- Once it is there:
 - Examine all possible ‘tradeoffs’
 - Have ‘insight’ to all second-order effects
 - Know architectural ‘limitations’
 - ‘Compare’ it with others
 - Size the ‘best’ performance circuit
 - Check for ‘reliability’
- He doesn’t like *optimization* since
 - it hinders ‘tradeoffs’ and ‘insight’,
 - doesn’t show ‘limitations’,
 - doesn’t guarantee ‘reliability’.



Verification

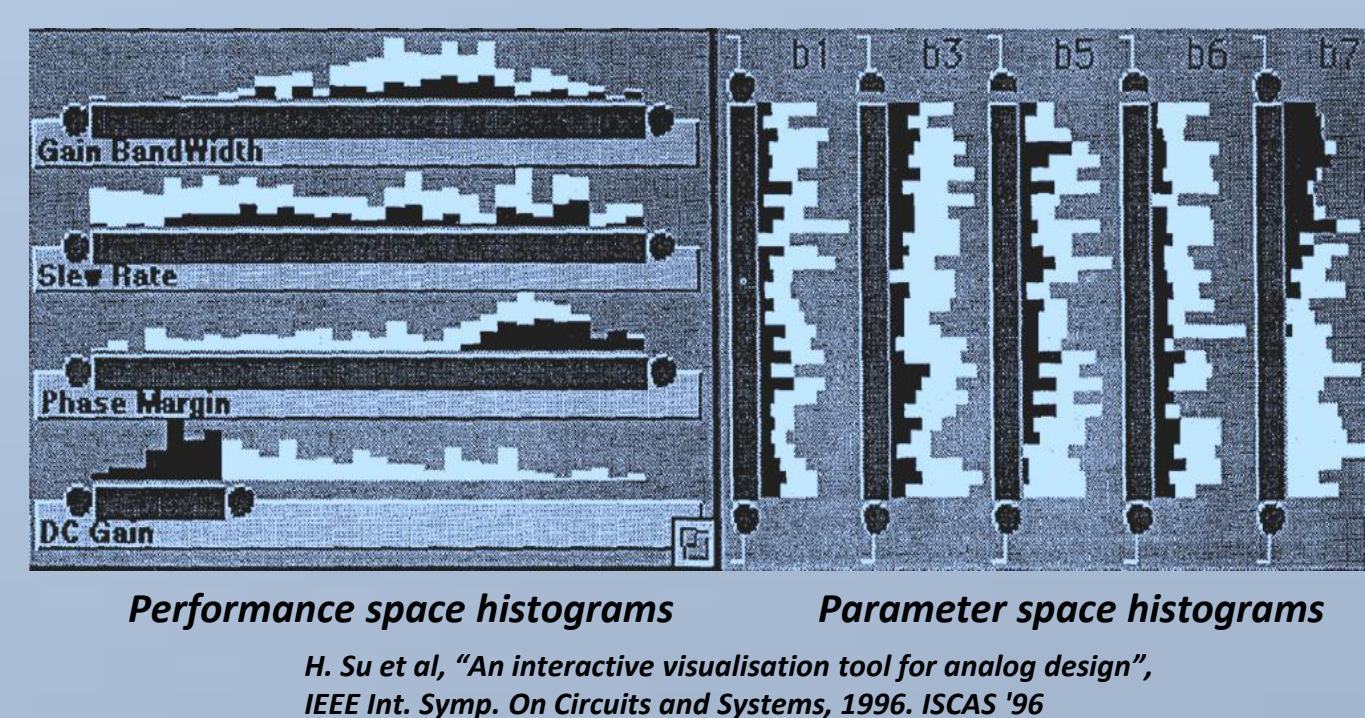
- Performance Verification:
 - The ‘only’ way to verify circuits is ‘massive transient simulations’
 - Demand on simulation ‘power’ is increasing
 - Some simulations can be sped-up through ‘smart’ analysis.
 - In many cases, designers are not aware of!!
 - Not straightforward to setup and interpret results
 - Toolbox = Simulation setup + complex input sources + related models + post-processing and graphical functions
- Functional Verification:
 - Behavioral model generation
 - Based on a desired behavior
 - Based on a given circuit
 - Behavioral model calibration



Design Supporting Tools

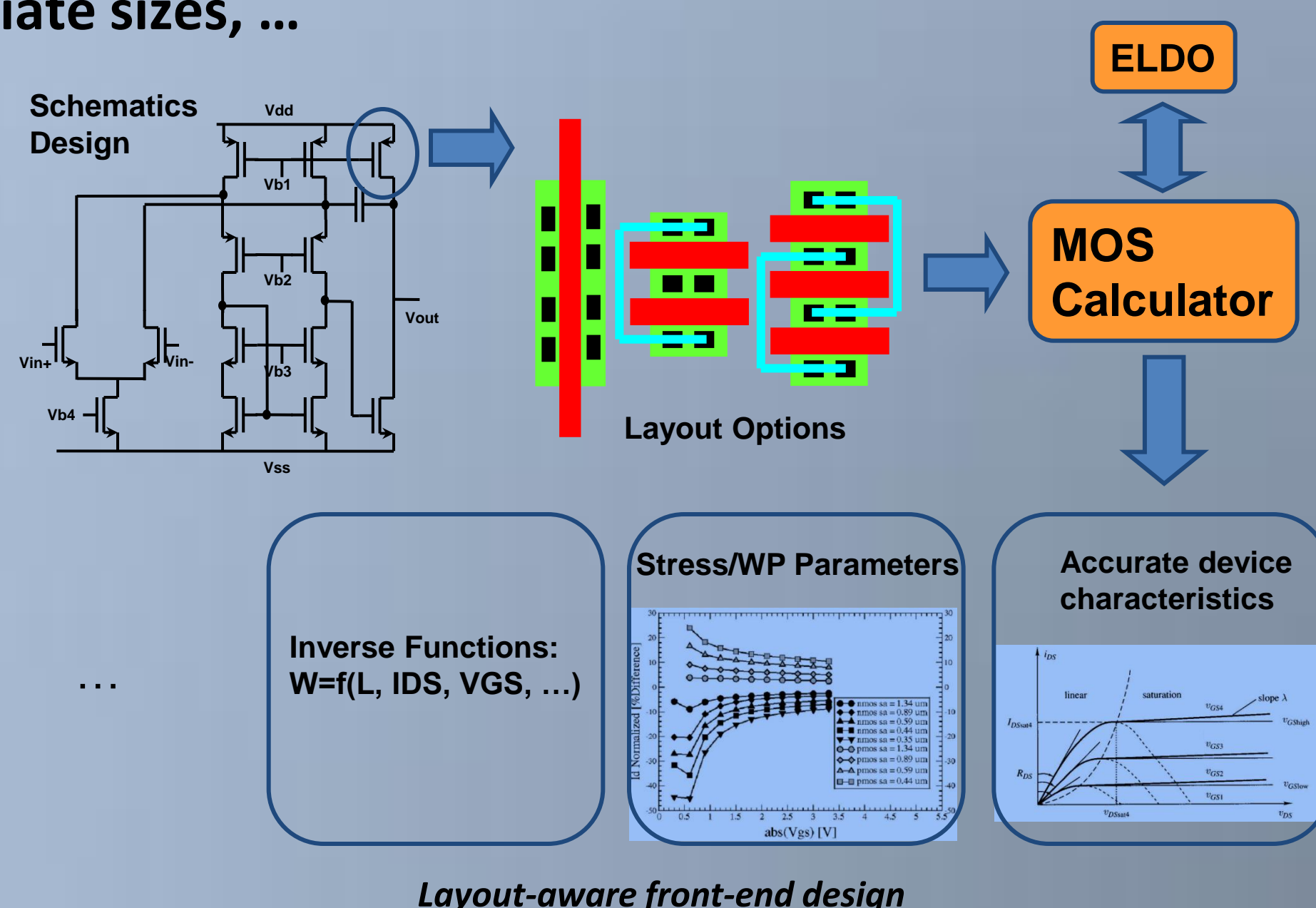
Analog Design Exploration

- 100’s of simulations.
- Visual tool based on histograms, sliders and color coding
- Both on performance and parameter spaces
- Increases designer ‘insight’ and shows ‘tradeoffs’



Layout-Aware Design

- Simple, text book transistor equations are no longer helpful to predict transistor behavior.
- STI stress and well proximity effects are only visible after the layout!
- Predict such effects during schematics design.
- Inverse functions: e.g., starting from transistor current, find the appropriate sizes, ...

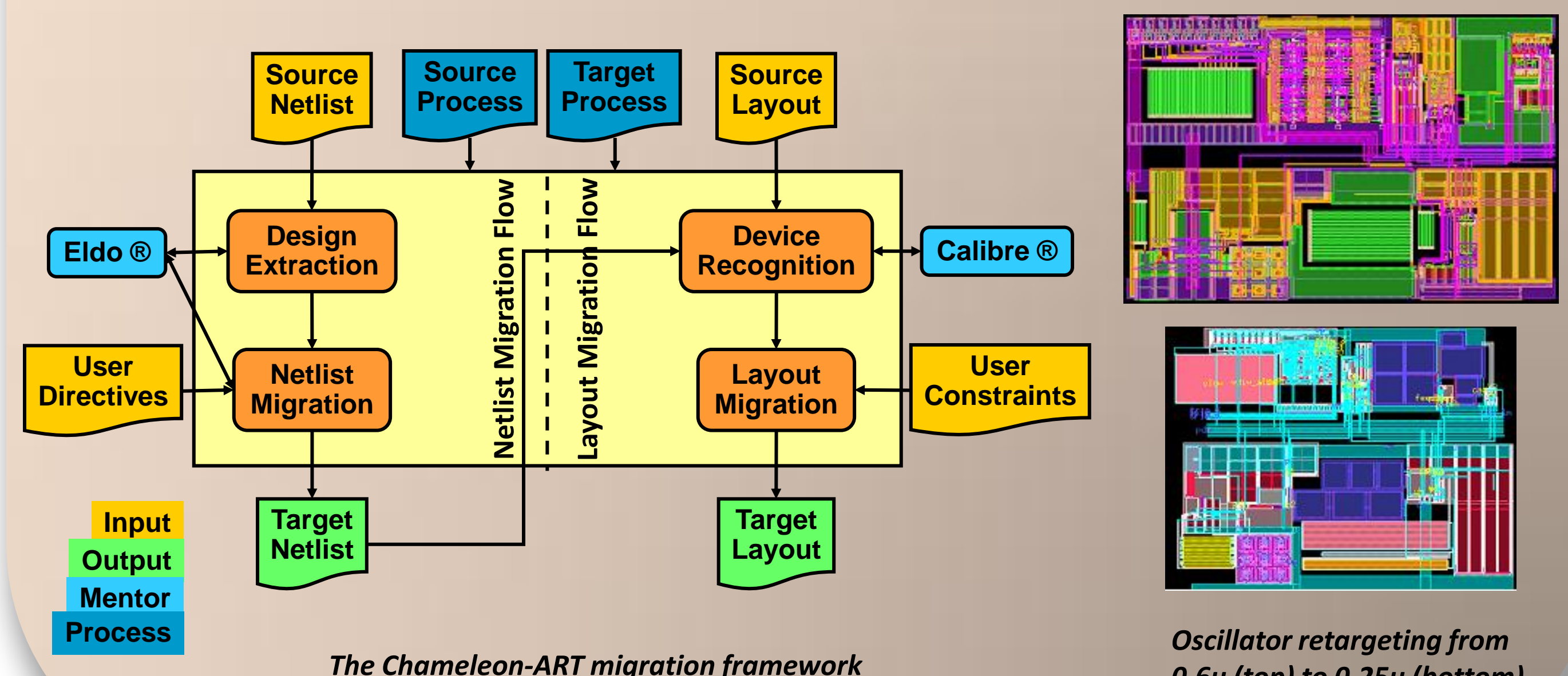


Analog Cell Layout Automation/Legalization

- From a designer perspective, layout is less creative!!
- Will soon accept automated layout solutions under market pressure.
- Complex DRs: context-dependant, equation-based, ...
- During layout, focus on performance-specific constraints.
- Let rule details be handled by a layout legalizer.
- Legalization is based on layout compaction with a *modified* objective.

Design Migration

- Key for IP providers, fabless design houses and foundries.
- Still a manual intensive process even if to the same performance.
- Netlist Migration: Designers prefer what they ‘know’ and what is ‘sure to work’ rather than ‘re-optimized’ designs.
- Layout Migration: A lot of know-how exists in original designs. Designers are very keen to keep and reuse such experience.
- The Chameleon-ART migration framework targets same performance migration blocks. No enhancement is targeted.



Oscillator retargeting from
0.6u (top) to 0.25u (bottom)