

# Revolutionizing Digital ASIC Design through AI

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# Motivation

The digital ASIC design flow is a complex ecosystem built on multiple knowledge layers:



Product-specific (internal/external documentation)

Tools (SolvNet/user manuals)

Design methodologies (internal councils)

Sign-off checklists

# Motivation

The resources efficiency is severely impacted by multiple factors:



Knowledge level required regarding product, tools and methodologies.

Poor integration of product-specific information within existing tools.

Overwhelming and potentially misleading noisy reports and logfiles.

Timely review of reports and logfiles generated from CI/CD flows.

Volatility of digital design flow standards.

Reduced support, time and/or knowledge, from senior peers.

Knowledge build up not carried over to the successors.

Checklists filling not inline with views development.

# Main Idea

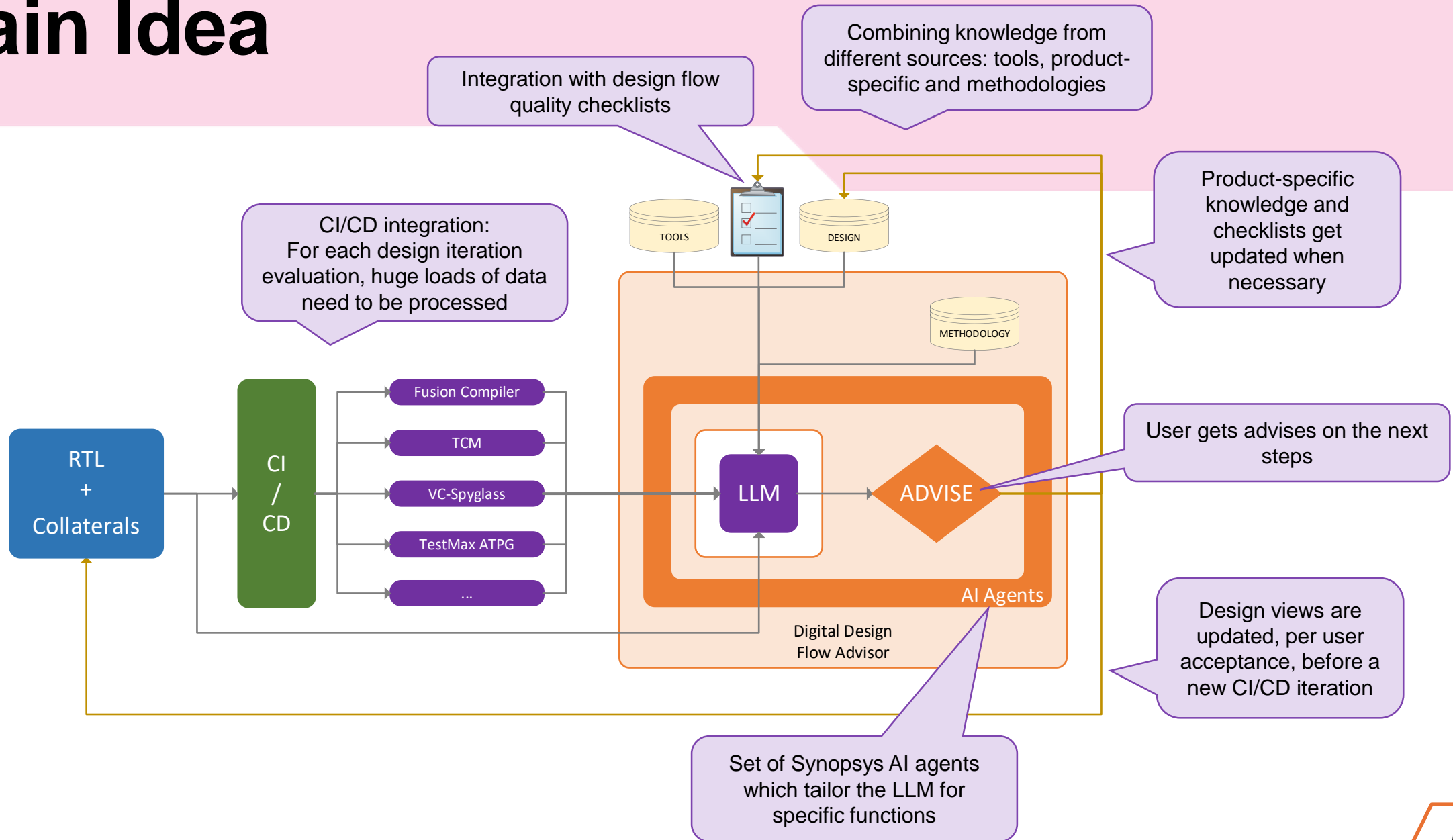
- **Development of a side-by-side flow assistant solution:**

- Seamless integration with existing flows (EDA tools and/or custom scripts):
  - Solution is easily embedded in teams' workflows/scripts.
- Integrate background execution without a chat interface with live interaction to facilitate decision-making processes.
- Facilitate views creation:
  - RTL, timing constraints, CDC waivers, ...
- Checklist integration for persistent reminders:
  - Real-time support and quality checks performed in the right time.

- **Knowledge build up for future design integrations.**



# Main Idea



# Main Idea

## Real-word application:

- Our tool sits on top of the CI/CD ASIC design flow process and is triggered on demand to analyze regression logfiles offline. It processes and analyzes these logfiles using an LLM based on a methodology guideline. This information is then summarized and prioritized by an AI agent. The user interacts with the flow assistant via a GUI, selecting from a list of recommended actions, and can also use a chatbot window for further discussion and task execution.

[AI-generated]



# Main Idea

## - **Specific contributions:**

- Using AI to enhance user experience and increase efficiency.
- Scalable solution, effectively handling large volumes of data.
- Integration between IP and EDA tools, ensuring a comprehensive design process.

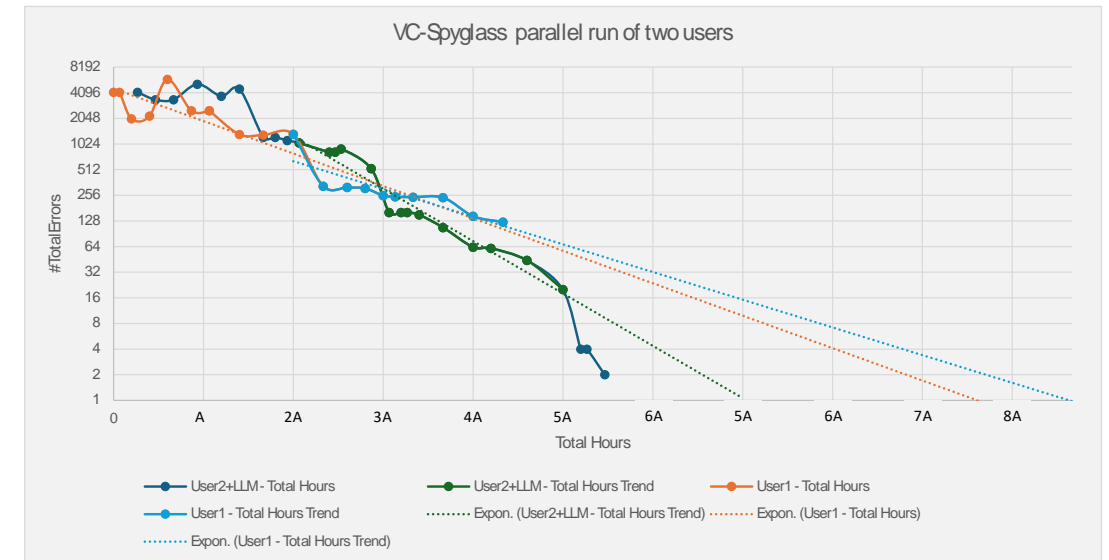
## - **Impact:**

- Results analysis and quality checks handling, ensuring a thorough and accurate design process.
- On-the fly suggestions to improve workflow efficiency.
- Tasks prioritization and navigation through design stages, reducing the workload for the user.



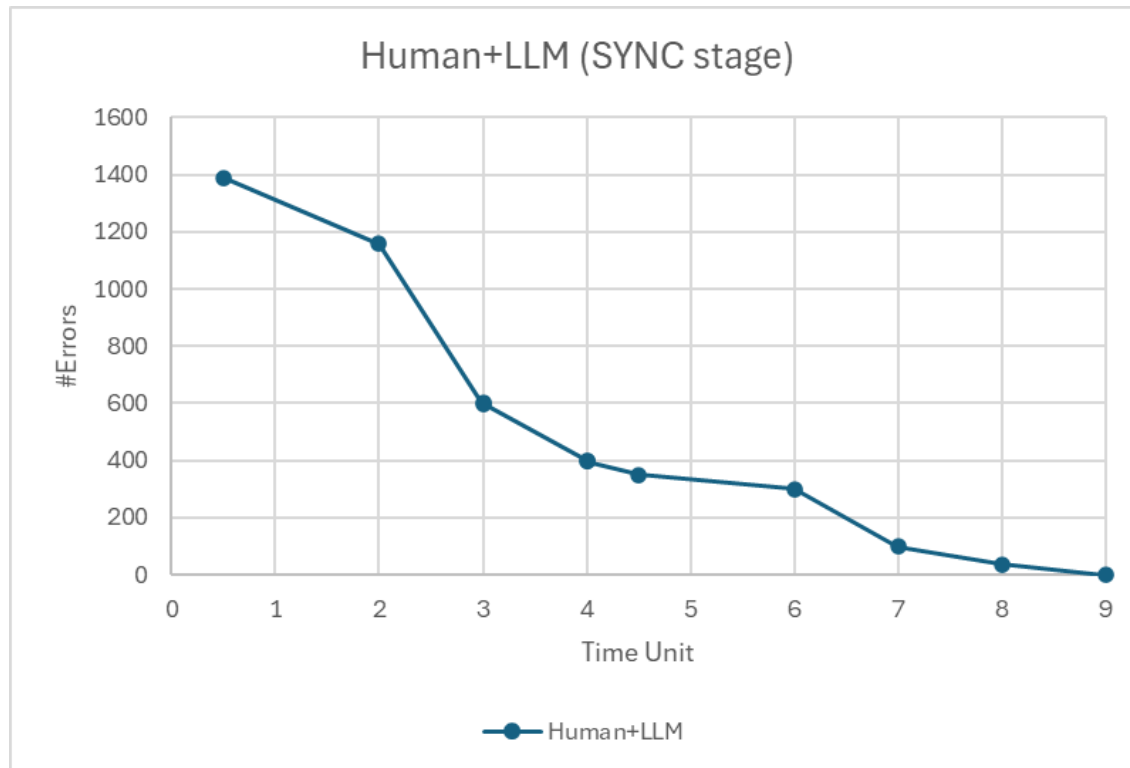
# Evidence

- **First feature:** CDC Advisor
- Why starting with CDC?
  - Noisy reports, many weeks of effort required, iterative analysis, ...
- Using SNPS VC-Spyglass tool
- Trial using SNPS mixed-signal IP:
  - Human vs Human+LLM
  - 2 resources with same level of expertise
  - Data from 3-4 weeks showing promising results:  
**20-30% efficiency increase**
- Notes:
  - Human+LLM effort includes tuning of the tool methodology.





# Evidence



Latest trial results:

- GUI-based version
- Different SNPS mixed-signal IP
- Human+LLM only results (no face-off)
- Human only would take double the time to complete (estimated).

# Evidence

## Effective Actions Evolution

SYNC - Effective Actions %



CONV - Effective Actions %



Advises effectiveness:  
~70-80% for SYNC related issues  
>80% for CONV related issues

# Summary

## - Key results:

- Implementation with LLM resulted in 20-30% effort time reduction.
- Improved CDC sign-off quality with tailored suggestions.
- Consistency achieved in constraints and waivers.

## - Performance metrics:

- Transitioned from thousands of errors to a manageable list of actions.
- Boosted efficiency with single interface for flow-related and product-specific questions.

## - Impact of LLM:

- Enhanced prioritization and filtering of issues.
- Reduced support needs from senior peers.
- Achieved 2x efficiency when errors dropped below 100.

LLM integration results in substantial productivity gains, improved quality, and decreased complexity, ultimately reducing time-to-market.



# Q&A

