

The cover features a dark purple background with a large, stylized rocket ship in the center. The rocket is white with a dark purple nose cone and a circular window. Below the rocket, a group of stylized human figures in various shades of purple are shown with their arms raised in a celebratory gesture. The background is decorated with several curved, overlapping bands in shades of orange and white. The title 'Startup Best Practices' is written in a large, bold, white sans-serif font, centered over the rocket and the group of people.

Startup Best Practices

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Introduction

Innovation and enterprise are alive and well in the semiconductor industry. Smart engineers with innovative ideas venture out to start their own companies. Startups are always under time-to-market and time-to-funding pressures and are in a sprint to get to the next milestone. The tendency under such pressures is to get started quickly on the business of designing the chip or IP that will change the world.

This eBook makes the case that adopting best practices and methodology early will lay the foundation to create a design team that is built to last. While taking the time to develop and implement best practices seems like a luxury a startup cannot afford, nothing is farther from the truth. Best practices are best implemented right from the beginning so it seeps into the DNA of the design team and will pay rich dividends as the team grows and tapeout pressures build.

What are 'Best Practices'?

Best practices are any conventions, rules or processes that help design teams collaborate better, to work more efficiently, avoid mistakes, and improve quality.



Best practices may include the following and more:

- ✓ Naming conventions
- ✓ Data storage and backup conventions and processes
- ✓ Design flows and handoffs
- ✓ Design management tools and methodology
- ✓ Issue tracking and other collaboration tools
- ✓ Project and schedule management

Why Adopt Best Practices From the Start?

It is important for a design team to have a common design 'language' to be able to communicate precisely and collaborate effortlessly. When conventions and methodologies are agreed upon and understood, then design team productivity is greatly enhanced. If there are any issues, then they can be more easily identified and fixed.

Typically, the core startup team comes from the same previous larger company. They are already familiar with the best practices used there and can easily be simplified and adapted for a startup. It is also easier to get consensus when the team is small and close-knit. As the team grows, you are likely to hire engineers with different backgrounds and who are used to different conventions. Arriving at a consensus with a larger and more diverse team is likely to take longer with more bruises in the process. However, if a new hire is handed a design guide when he or she starts, then there is no room for argument. It is just the law of the land.

Also, it is a lot easier to adopt conventions and guidelines when there is no previous baggage. If best practices are adopted later, what happens to all the existing design work? Changing it to meet the new guidelines would be a waste of resources but not doing so could lead to confusion later.

Best practices, well documented and followed, make onboarding for new engineers so much faster. It is easier for them to understand the existing design components and follow the conventions and processes going forward. It makes it easier for the new engineer to come up to speed and reduces the time spent in training. This makes the whole process much more efficient and error-free.

Are Design Management and Other Collaboration Tools Needed?

Design management, issue tracking, and other collaboration software have become essential best-practices tools in a design team's toolbox. This is because design teams have to hire the best talent they can anywhere in the world. Even the smallest design teams are often distributed across different time zones. Collaboration tools take on a new level of importance to help keep distributed teams in sync.

Startups are usually trying to conserve cash and want to minimize capital spending. Therefore, there is a tendency to avoid spending on tools that are not considered essential. While issue-tracking systems such as Jira or messaging systems such as Slack may be adopted later as the team grows, it is important to make sure that a design data management system and methodology is in place from day one.

Best practices may include the following and more:

- ✓ The value of a startup is in the people and the IP they are developing. It makes sense that this very valuable IP is managed in a safe and secure manner. Using ad-hoc methods like shared design libraries, naming conventions as a substitute for revision control, soon becomes untenable and can lead to lost data and unpredictable results.
- ✓ The design team has to be super-efficient even if they are distributed. Only a design management system can help to make sure that everyone is in sync and no design changes are accidentally overwritten or lost.
- ✓ A startup is likely to change course several times as market requirements or technology evolves. The design team needs to be agile enough to change course or try alternatives efficiently.

- ✓ A startup design team is often navigating uncharted waters. For every few steps forward, you are likely to have to take a step or two back every now and then. It is a lot easier to do this when all design data is revision controlled and all changes are tracked in a design management system. This is of paramount importance during a tapeout when designers are working insane hours on little sleep. Errors are likely to happen and you need a design management system to identify and revert or correct a mistake quickly.
- ✓ When new engineers are hired, all they have to do is create a workspace and they are ready with all the necessary design data. No other instructions are needed and they don't have to go fishing around to find all the design libraries. Also, since they are working in their own workspace and everything is revision controlled. There is no danger of them overwriting or deleting any changes.
- ✓ Large customers are often demanding and a startup has to be nimble and adaptable to survive. This means that the design team needs to be able to develop, manage and maintain multiple variants of the same chip or IP to meet a large customer's needs. This would become a nightmare without a design management system.
- ✓ If there is a design modification, the ability to refer back to a production design and know all IP revisions used avoids using an incorrect IP. This obviates cost overruns a startup can ill afford.

These are some of the reasons why most new startups over the last decade, adopt a design management system right from the inception along with the design, debug and verification tools.

“Throughout the design process, we have used Cliosoft’s SOS revision control tool to back out of a change that did not work out or to retrieve an accidentally deleted database. Without automated revision control, we would have lost work which would have impacted our schedule greatly”

Steve Chin,
Director IC Engineering at Efinix, Inc.

Keep it Simple

KEEP IT SIMPLE

When Choosing a Design Management System



Founding engineers of a new startup may come from large semiconductor companies with mature design methodologies. These methodologies, while needed for a large organization, may be overkill for a small, agile startup. When developing your methodology, learn from your previous experience but adapt it to the new reality. Keep methodologies as simple as possible to meet your needs. It is just a fact of life that a simple and clear set of rules leads to higher compliance.

When selecting a design management system or any other collaboration tool, make sure that it is simple to set up, administer and use. A startup often cannot afford a full-time CAD or IT engineer. Typically, a lead engineer picks up this task and it is best to minimize his or her time with CAD- and IT-related tasks.

IT Considerations

Design engineers are storage and resource hogs. Designs are huge, user workspaces take up all the storage you can give them, and verification tasks require insatiable amounts of computing power. To optimize valuable engineering time, you have to dig deeper into your IT budget, not only for the capital expenditure but also for the IT resources required to manage and configure your compute and file servers, as well as the network.

Firstly, you need reliable network storage, as you cannot afford downtime and lost data due to a disk crash. Netapp and DELL EMC network storage servers are high performance and very reliable but definitely not cheap. You need to make sure that you optimize the use of this expensive resource. Typically, user workspaces are the biggest consumers of storage. The same user may have multiple workspaces, each having a full copy of the design. This adds up fast, especially as the team and project size grows. A software configuration management (SCM) system, such as GIT, SVN or Perforce P4 is designed for managing software that typically has a large number of small text files. When a user creates a workspace, you get a full physical copy of all the files. However, a typical design project may have many thousands of very large files. Creating workspaces, using a design management system built using an SCM backend, can become prohibitively expensive over time, as each workspace has a full copy of the entire project. Design management systems built for IC design recognize this problem and optimize for it. Workspaces are created with read-only links to a shared cache. The use of cache servers is essential to save disk space. Every design has a need to archive large files which will eat up disk space if a read-only cache is not available. “There is always a need to archive large files such as a revision of a tapeout GDS or simulation waveforms. Without a cache server, the hit on disk space will be massive if duplicated across all user workareas” said Steve Chin, Director IC Engineering at Efinix, Inc. Duplication is eliminated, and only files being edited are placed as physical copies in the user workspace. This dramatically reduces the need to feed the storage beast and reduces IT spending.

Startups should also consider using the cloud. The elasticity the cloud provides allows startups to scale up quickly for peak verification time and scale down during the early design cycle. Some startups choose to be exclusively in the cloud. Others choose a hybrid model where normal usage is handled on-premise and peak usage in the cloud. In a hybrid model, the cloud can be considered as another design center.

You can run a design management cache server in the cloud. The cache server will only pull the changes since the last cache synchronization optimizing the time to upload the changes to the cloud.

Startups, much like teenagers, may have an invincibility complex and sometimes tend not to prioritize safety measures such as backups. While it is entirely likely that you will never need to rely on a backup, it is still essential that you have a reliable backup system in place as an insurance policy. You do not want to be in a situation where you are close to a tapeout and you have a storage malfunction and lose a lot of your data with no way to recover.

Conclusion

A building may look beautiful, but it needs a good foundation. You don't see the foundation, but it must be strong for the building to last long. Design methodology, management and other best practices of design are the foundation that the successful projects are built on. If you are planning on building a company to grow and last a long time, then make sure that you pay attention to the foundation.