

WORK IN PROGRESS

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Learning Objectives:

1. Learn how to use Fusion 360 and EAGLE software's TEAM and Collaborative Features
2. Learn Best Practices to Enable Team Members to Simultaneously Build Assemblies and Subassemblies
3. Learn About Team Dynamics and Collaborative Workflow
4. Discover how Fusion 360 joins your remote workers into a functional and thriving team

Background

Design is a multidisciplinary skill. While an individual can undertake a design project it's common for a project to use skills and input from a diverse group of professionals including designers, engineers, managers, stakeholders, vendors, and even customers. Autodesk is known as a leader in developing tools to speed up and improve the design process and also the end product. This presentation is about Fusion TEAM and more specifically how to leverage it with Fusion 360 and EAGLE.

Terms

Fusion 360: Fusion 360 is an Autodesk Cloud based Parametric and Direct Modeling CAD/CAM/PCB/Schematic program.

Eagle or Eagle CAD: Electrical Design, schematic and PCB cad software that has been folded into Fusion 360 and is now a part of it.

Fusion TEAM: Software to store a project's data so that everyone allowed to access it can do so with a clearly defined set of roles.

Top Down Modeling: A design process where the whole product is designed first and then broken out into components. It's like designing from the outside to the inside of the product. For example, if you were designing a new computer mouse you would design the final shape of the computer mouse first and then break its shape into its individual elements.

Bottom Up Modeling: A design process where each component of the design is made and then assembled into the final product. It's like designing from the inside to the outside of the product. For example, if you were designing a new computer mouse you could start with designing the screws that hold it together, the shape of the circuit board, the buttons that are used to make up its interface, and etc. Once all parts are made you can assemble them into the mouse.

Middle Out Modelling: A design process where you use both Top Down and Bottom Up methods of modeling your design. This is the most common design strategy. A major reason for this is driven by Fusion 360's ease of inserting completed parts from vendors. You don't need to model screws, bearings, or electrical components because Fusion 360 gives you instant access to millions already made.

Parametric Modeling: Parametric modelling is a modeling technique where you design a model that is driven by parameters. This enables you to specify precise lengths, angles, and positions of objects so that you can quickly modify them. A timeline is maintained so that you can go back to any design choices made and adjust them. This is like creating a map to get to a destination. If you find that you have made a wrong turn or discover a better way to get to the end destination you can adjust the steps to get you there.

Direct Modeling: Direct modeling is a modeling technique where you design a model by directly modifying it. No timeline is kept with direct modeling. This means that you cannot go back to earlier design decisions and modify them. You can only modify the design in its current state. This is like baking a cake. Once you begin mixing the ingredients it is difficult to unmix them and you need to move forward with what you have.

CAD: Computer Aided Design is software that is used to create computer models of products.

CAM: Computer Aided Manufacturing is software that generates machine tool paths and g-code to enable CNC manufacturing of parts.

G-Code: G-codes are codes that instruct CNC machines to machine parts. They include movement, speeds, feeds, coordinates, and other information needed to mill, lathe, or laser cut a part.

CNC: Computer Numeric Control is a technology that uses software to control machine tools like lathes and mills. A CAD program will generate a computer model that a CAM program can design tool paths to create and generate g-codes from. These g-codes drive the mill or lathe to cut material into the finished part.

Team: A team is a group of people working toward a common goal.

Team member: An individual who is part of a team.

Workgroup or Group: A group of people working individually under a group name. This is different than a team because they are not working together toward a common goal. An example would be a “study group”. In a study group each is working to earn their own individual grade, they work together, but for different goals.

Role: A responsibility to perform a specific set of tasks.

Process: steps to take to get a specific result.

Flow: A state where people work in a synergistic and focused manner toward a clear goal.

What's a Team?

Simply put, a Team is a group of people working toward a specific goal. And when a team has the right vision, effective leadership, harmonious team members, resources, and a deadline, they can achieve flow and achieve great things.

There are many ways to organize teams. Some common team structures are...

GPRI

GPRI by Rubin, Plovnick and Fry is one such model. It describes teams in terms of

- **Goals** – objective and desired results expected from the team's efforts
- **Roles** – responsibilities of team members
- **Processes** – rules that govern interactions as well as work procedures
- **Interpersonal Relationship** – how team members interact through communication, trust, and flexibility

T7 Model

The **T7 Model**, by Eichinger and Lombardo, believes the following 7 words, all beginning with "T" are the key to a good team. The words are...

- **Thrust** – a goal for the team to "thrust" toward
- **Trust** – the belief that your teammates are there to help you
- **Talent** – the team must have the skill to achieve the goal
- **Teaming Skills** – a team's ability to function as a team
- **Task Skills** – commitment to execute
- **Team Leader Fit** – a team's leader's ability to inspire the team to achieve its intended goal
- **Team Support from the Organization** – teams require resources to achieve success

Five Dynamics of Teamwork and Collaboration

The **LaFasto and Larson Model** is another team structure model. LaFasto and Larson investigated several hundred teams to search for key characteristics of effective teams. They discovered 5 characteristics that they believe matter.

- **Team Member** – the right person, with the right skills, and temperament
- **Team Relationships** – Trust, healthy work environment, honest communication
- **Team Problem Solving** – ability of team members to work together to solve problems and move project ahead
- **Team Leadership** – Leadership fit that enhances and strengthens team
- **Organization Environment** – Organizational support including resources, environment, and systems to enable team to effectively work together.

The Pirate Ship

It may sound strange but Pirates were highly effective and organized teams. To be a successful Pirate you followed a code, had an org chart, and shared in the rewards of team efforts. The Captain actually worked at the behest of the crew and would be summarily replaced if he didn't work for the benefit of all. This is probably why Steve Jobs famously flew a pirate flag as he worked on the original, new, and first Macintosh.

Which Team Structure is Best?

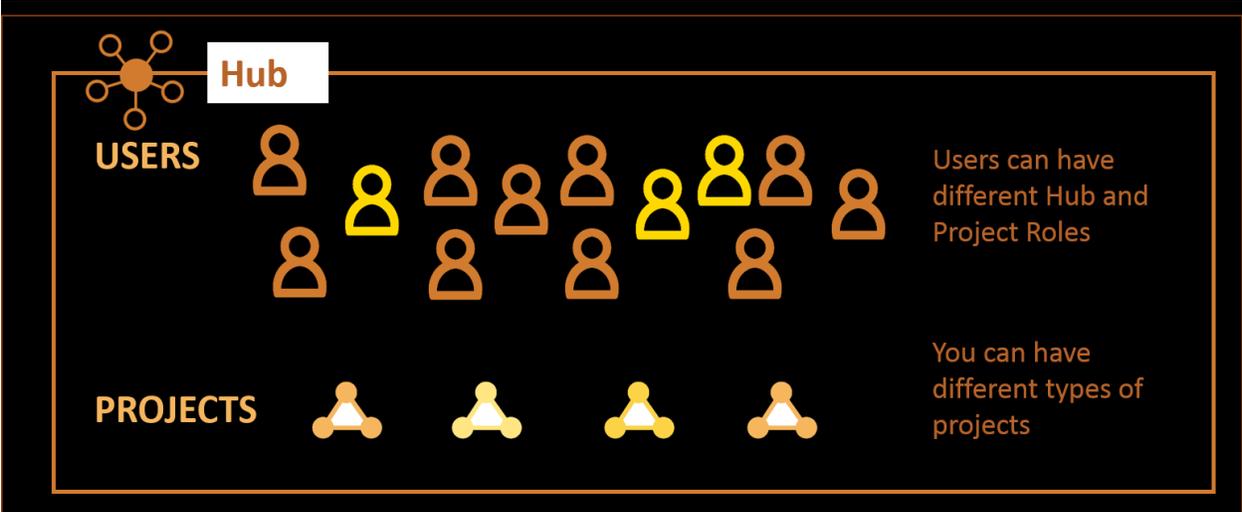
The truth is the team structure will depend on the reason for the team, the team member's needs, and the skill of the leader. Some teams need a strong formal leadership structure, while others use an informal structure and share leadership. The team structure will depend on the team, the goal, the team members, and the tools you have available.

Fusion TEAM

Fusion TEAM is a cloud-based storage and versioning system for product development. It provides the following features needed by high-performance teams to achieve design goals and increase speed of design projects. The main features of Fusion Team are;

1. **Centralized Cloud Storage** – Storage available to everyone on the team. This enables teams to share the latest versions of components, models, assemblies, and also supporting documents including PDF's, images, and other files.
2. **Smart and Secure Storage** – Fusion TEAM understands CAD files and team roles. Once setup, it will moderate access so only the right people (authorized) have the right access to the right files (current versions). Some team members can edit the files, others only review and comment, others have no access to the files but will see them, and some will not even see the files. By giving an Administrator the right to determine who has specific access to each file you can focus your team's efforts in the right direction while maintaining file and project integrity.
3. **Versioning** – Fusion 360 maintain cloud-based versions of your files. This feature has two major advantages; 1) it ensures that everyone knows which file versions are the current versions, and 2) it enables you to go back in time if you need to roll back changes that are not acceptable. Fusion TEAM also tracks who made the changes and when they were made. This gives the project manager control over the project and an ability to track changes and speak with the designers about them. It is a powerful tool.
4. **Preview and Markup Designs In Web Browser** – View drawings and cad files (2D/3D) in browsers on any device. This feature enables stakeholders to track progress and comment on design features. By bringing design feedback early into the development cycle teams can iterate quickly and capitalize on ideas and opportunities in real time.
5. **Discussions** – Development teams can use Fusion TEAM to initiate, track, and integrate discussions into the design process. Faster feedback and better communication make for a better design.
6. **Project Organization** – Fusion TEAM organizes data into PROJECTS. All related data is part of the associated project.
7. **Roles** – Users are assigned roles. Roles control which files users can work with and what rights they have with those files.

Fusion Team Hub Project Layout



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Fusion TEAM System

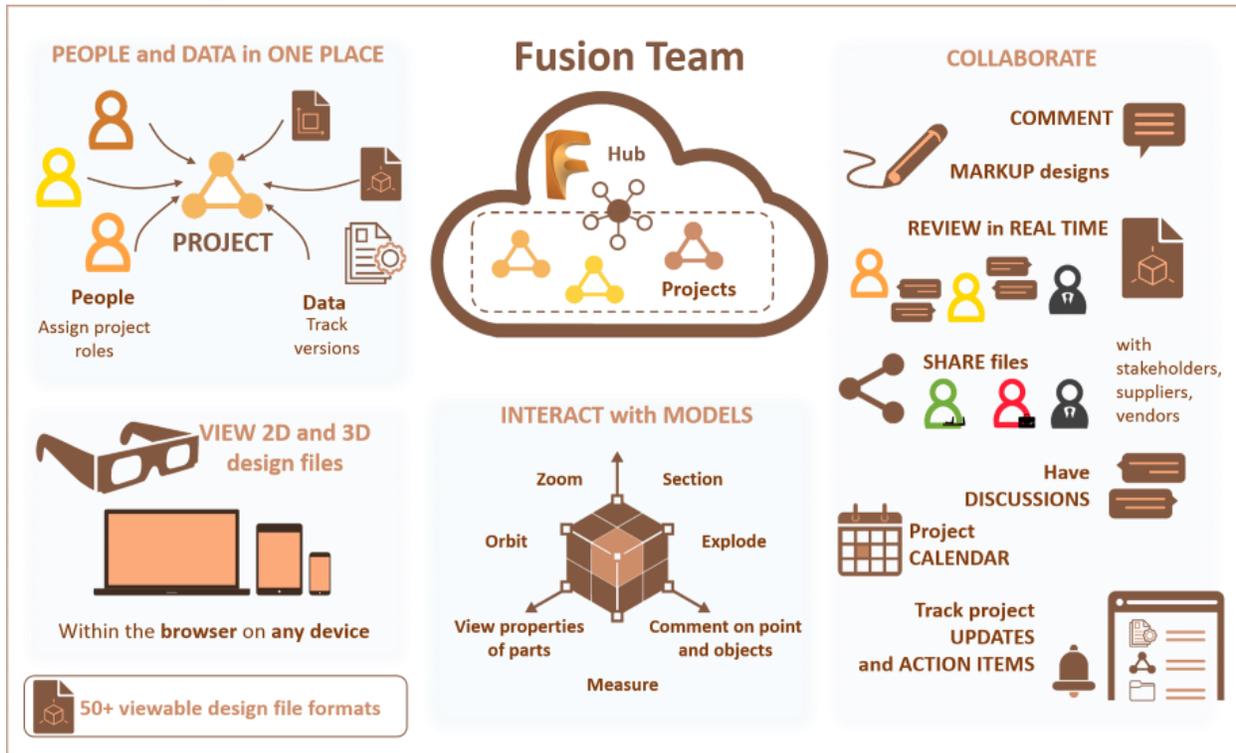


Figure 1 <https://help.autodesk.com/cloudhelp/ENU/FSNT-LearningCenter/images/GUID-FA8COA0E-EA66-49DB-A167-8288513EF529.png>