

# Lean & I4.0 Integration

## Achieving Manufacturing Excellence



Mudita  
**Strat-Aegis**

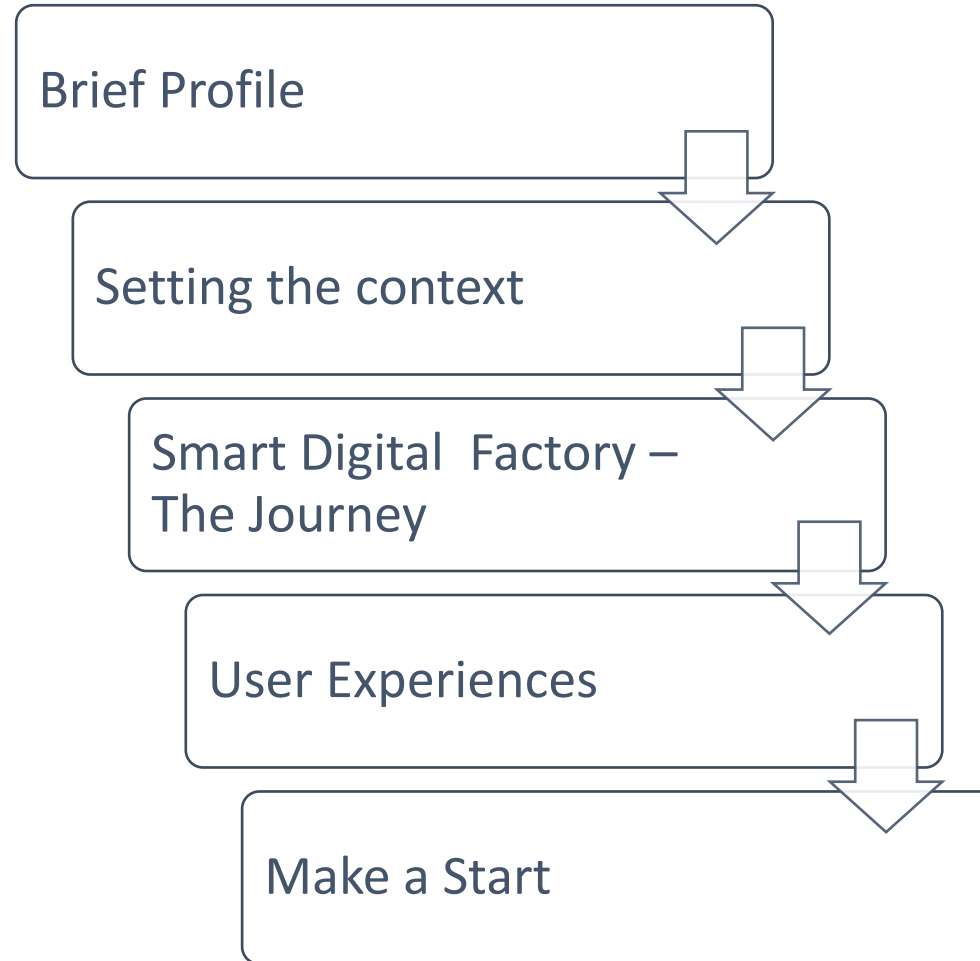


Ravi Ramarao  
Executive Partner – Mudita Strat-Aegis  
Trusted Advisors & Manufacturing Consultants

<https://www.muditastrat-aegis.com/about.html>



# Digital Transformation - Factory of the Future





# About Mudita

## Clients

- Manufacturing domain (Auto, Engineering, Construction & Mining, FMCG, Appliances, Packaging industry and Pharma)



## Objectives

- Trusted Knowledge Partner
- Shared success by providing economic value addition to our clients



## Approach

- Flexible, Adaptable, Customized Sustainable solutions;
- Embrace “Execution” as integral part of our strategy;



Ravi Ramarao –  
Executive Partner  
Mudita Strat-Aegis

International Business Leader with 32+ years of overall experience in Connected Manufacturing - Digital / IOT / E2E Enterprise Supply Chain Consultancy to Fortune 100 industrial manufacturing clients.  
Large Global Program Management Expert

**Accolades** – India National Expert for MSME – I4.0 Solutions – APO, Tokyo

**I believe :**

Sensors, Software Solutions & Platform ...is the way forward

Smart Manufacturing, Data Science, Algorithms & Predictive Analytics are the areas to invest - the life-lines to remain in the market

|           |   |
|-----------|---|
| Expertise | Digital Transformation                      |
|           | I4.0/ IIOT / Smart Manufacturing            |
|           | Technology, Solutions & New Business models |

**Professional History –**

Chief Architect – I4.0, Robert Bosch

Business Leader – Manufacturing IT & Plant Solutions - TATA Consultancy Services:

Manufacturing – Design, Engineering , Build & Operate in Petrochemicals , Oil & Gas Industries - Yokogawa

**Game Changers**

1. E2E Digital Supply Chain
2. a)Domain Driven – b)Technology Enabled
3. Inter operable Systems

1. **Industry 4.0** is very special. . . . helps in **the faster evolution of factory automation**
2. **Products, solutions, competencies & business models** will be upgraded evolutionary
3. Industry 4.0 is an **accelerator** and a very good operating lever to increase efficiency, improve productivity & reduce waste

## The Context

I 4.0



Connectivity,  
IT Automation



Robotics solutions  
Logistics solutions

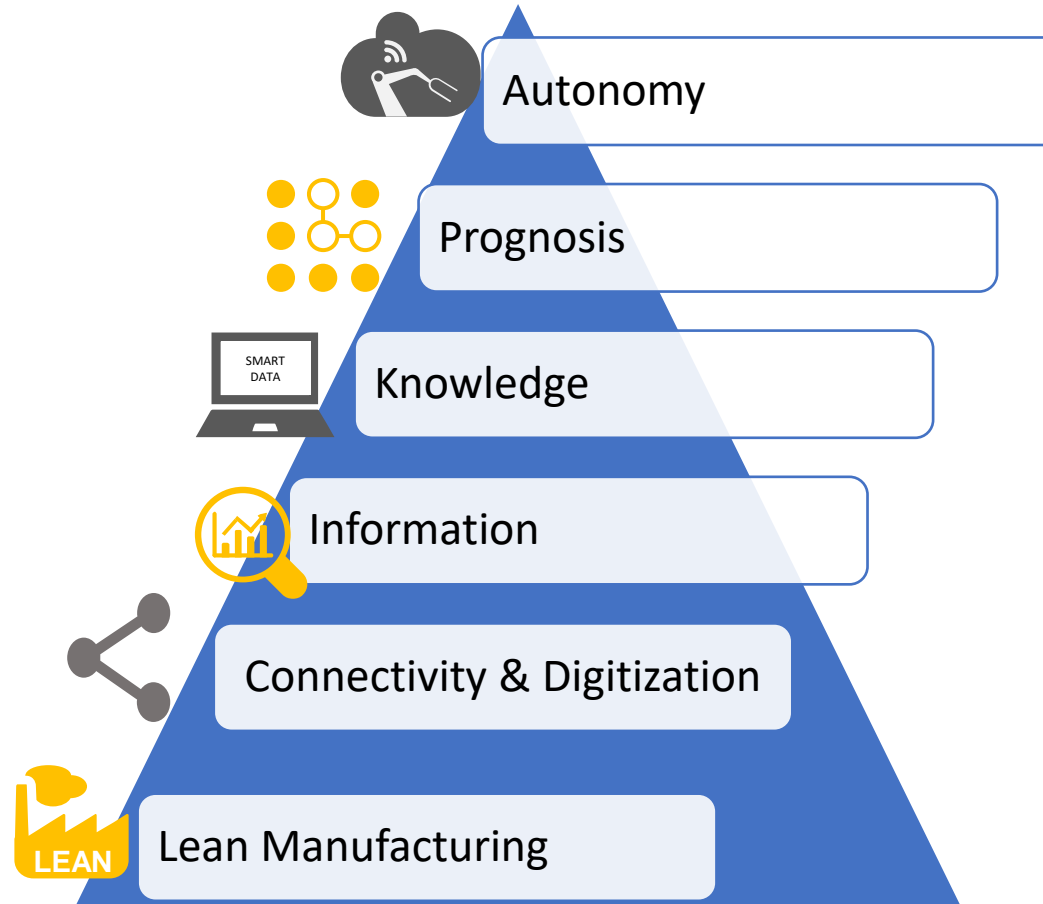


Broader Software  
Portfolio



New Payment &  
licensing models  
Data-driven service models  
Smart Products,

# The Stages



**Autonomous & Optimization :**  
Self-guiding products

**Predictivity**  
Pattern recognition /Pred Maint

**Data Analytics**  
O & M Support

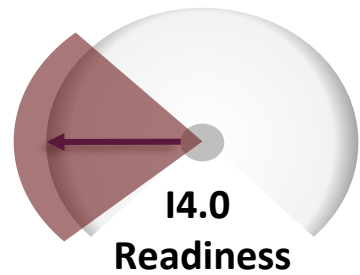
**Data Transparency**  
KPI & Metrics - Smart Cockpits

**Data Gathering**  
Sensors, IoT Gateways, EDI

**Lean Manufacturing** is  
THE pre-requisite of a smart factory

# The Journey

**Establish Strong Fundamentals**  
– Methods / Principles



**Step 1: Process Strong - Lean**

|              |                     |             |
|--------------|---------------------|-------------|
| ITM-Security | IT-Infrastructure   | IT-Services |
| Control      | Process time (= 30) | Modularity  |
| Workflow     | Responsibility      | <b>LEAN</b> |

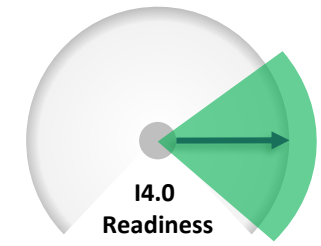
**Build Robust Data Foundation**



**Step 2: Digital Enabled Factory**

|             |               |               |
|-------------|---------------|---------------|
| Interfaces  | Data formats  | Global Access |
| Flexibility | Process-KPIs  | Product Data  |
| IT-Systems  | DB-Structures | IT-Security   |
| <b>LEAN</b> |               |               |



**Factory of the Future**



**Step 3: Connected Factory**

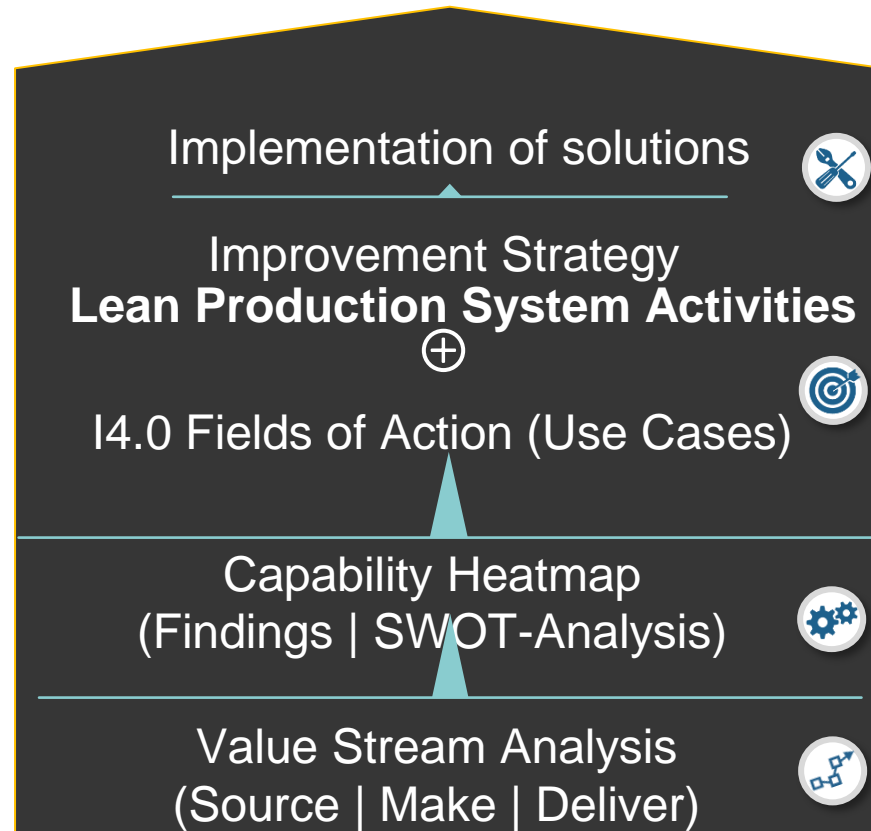
|                                |               |             |
|--------------------------------|---------------|-------------|
| Cloud Data                     | IoT           |             |
| Self Control                   | CPS           |             |
| IT-Systems                     | DB-Structures | IT-Security |
| <b>Digital Enabled Factory</b> |               |             |
| <b>LEAN</b>                    |               |             |

## Couple of Use Cases

| Deployed Solution  | What it does?  | Benefits realized  |
|--|--|--|
| <p data-bbox="690 258 1217 362"><b>Active Cockpit<br/>(For Shop floor Transparency)</b></p>            | <ul data-bbox="1274 258 1821 621" style="list-style-type: none"> <li>• Enables transparency on enterprise-wide KPIs to a centralized dashboard</li> <li>• Filters &amp; visualizes the real-time data to enable faster decision making</li> </ul>  | <ul data-bbox="1916 258 2446 778" style="list-style-type: none"> <li>• Real-time transparency on enterprise-wide KPIs</li> <li>• Enabling near real-time decision making</li> <li>• Paper-less factory</li> </ul>  |
| <p data-bbox="690 839 1217 939"><b>Intelligent Quick-Changeover Multiproduct Handling system</b></p>  | <ul data-bbox="1274 839 1847 1228" style="list-style-type: none"> <li>• Zero retooling required for next variant production.</li> <li>• Autonomous interaction with the assembly systems for sourcing the input materials.</li> <li>• Facilitates error-free multiproduct handling.</li> </ul> | <ul data-bbox="1916 839 2420 1285" style="list-style-type: none"> <li>• Faster Changeovers &amp; Zero retooling</li> <li>• Precise sourcing of input materials</li> <li>• Effective management of work procedures</li> <li>• 10% productivity improvement</li> </ul> |



# The Approach



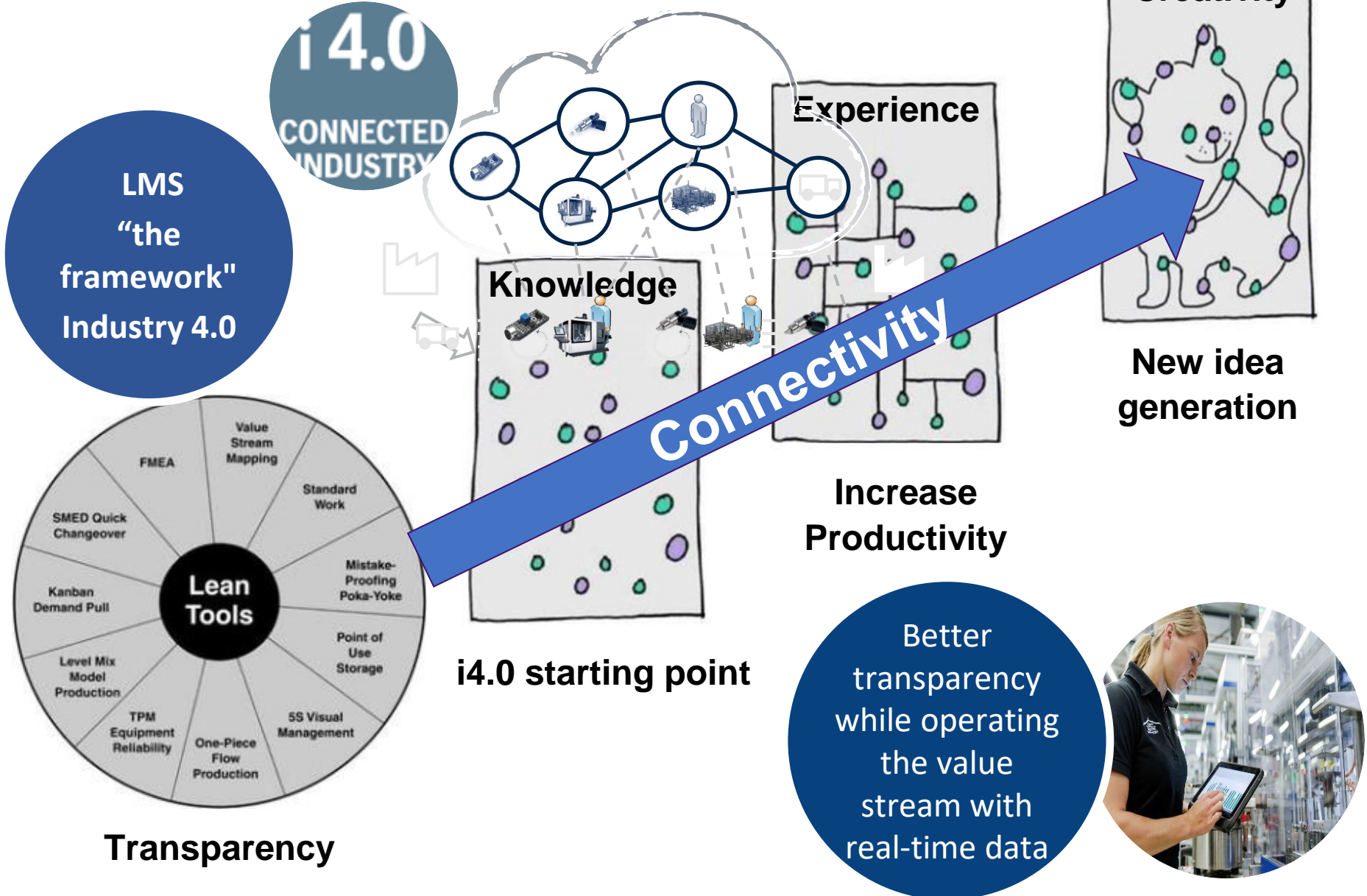
**Operations View**  
Bottom-Up

## Strategic View Top-Down





# The Future



# The Focus



## Living Legend – Strong Concepts

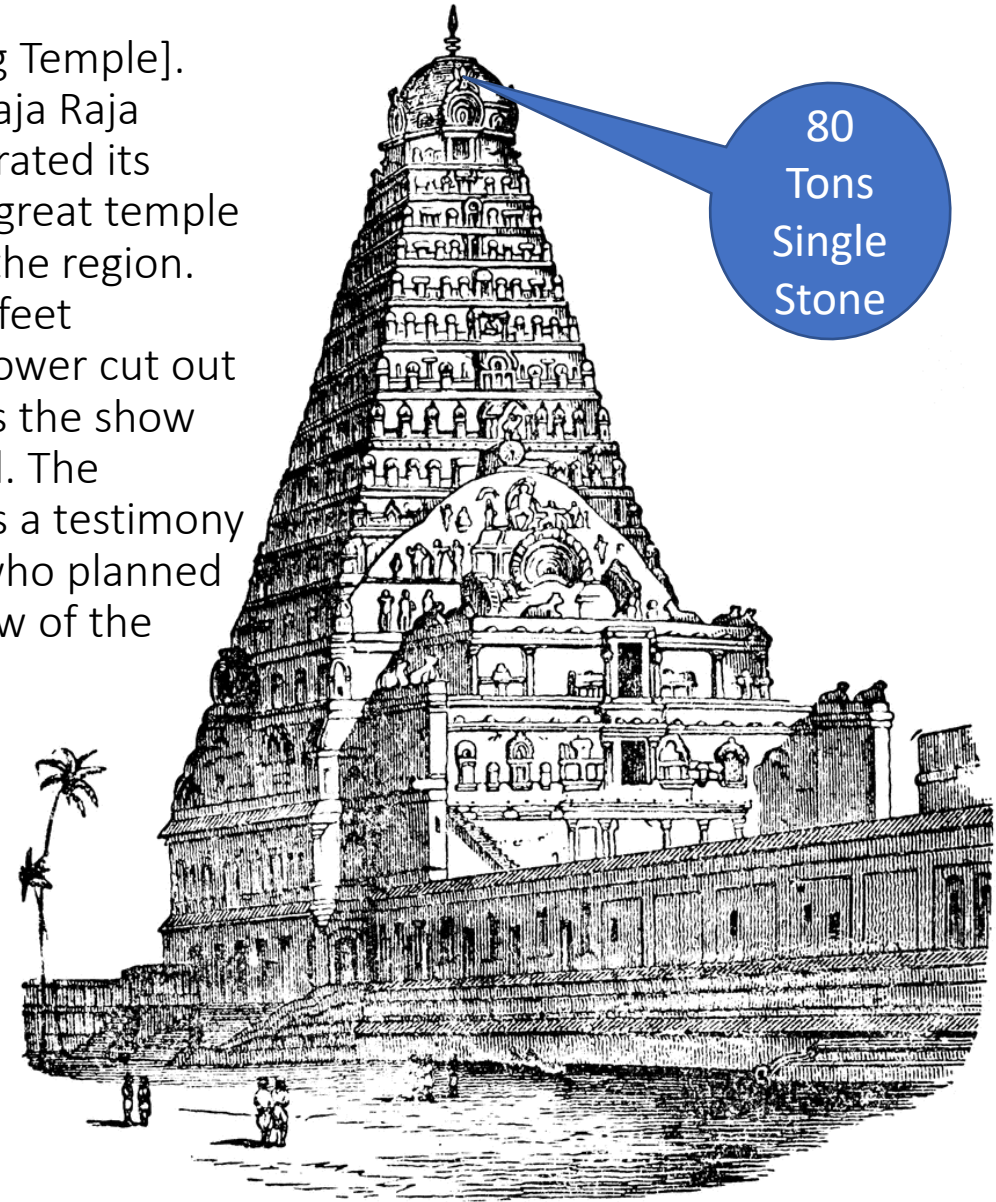
This popularly known as Thanjai “Periya Koil” [Big Temple]. This temple was built by Great Chola Emperor Raja Raja Cholan I in the year 1010 AD . This temple celebrated its 1000th year of existence in the year 2010. This great temple is an example of the architectural excellence of the region. The Tower above the sanctum Sanctorum is 216 feet tall. "Kumbam", a bulbous structure above the tower cut out of one rock weighs almost 80 tons, is regarded as the show case of the Architectural Excellence of the period. The majestic tower and lifting the cupola to the top is a testimony to the engineering skill of the Chola Architects, who planned its construction in such a manner that the shadow of the Cupola does not fall on the ground.

Built –  
1010AD

Height -  
216 ft

Witness  
11.0 – 14.0

## The Big Temple



**BRIHADEESWARAR TEMPLE, Thanjavur, India**

# Thank you

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