Stages of Design and Technology Readiness

Technology Readiness Level	Design Stages	Time Period (Years)	"MADE IN INDIA"	"MAKE IN INDIA"
6	System/ Subsystem model or prototype development and demonstration in a relevant environment	**12 (R,D&T Stage)**	**Know Why Remains in India & Adds Value to National Security**	**Remains with Foreign Company Hence a Vulnerability to National Security**
5	Component and / or breadboard validation in relevant environment			
4	Component and / or breadboard validation in laboratory environment			
3	Analytical and experimental critical functions and/ or characteristic proof of concept			
2	Technology concept and/ or application formulated			
1	Basic principles observed			

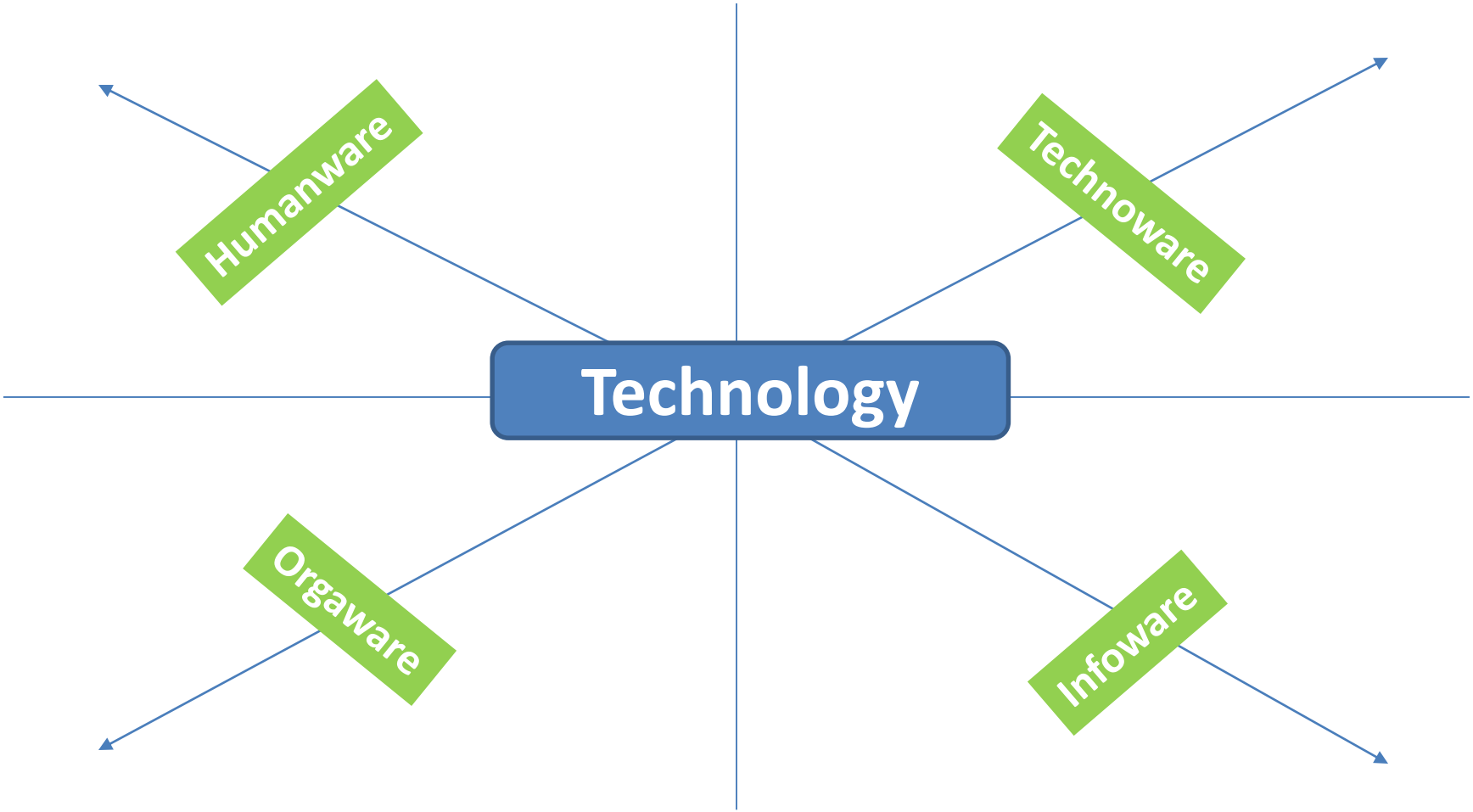
Stages of Design and Technology Readiness

<table>
<tr><th>Technology Readiness Level</th><th>Design Stages</th><th>Time Period (Years)</th><th>“MADE IN INDIA”</th><th>“MAKE IN INDIA”</th></tr>
<tr><td>9</td><td>Actual system flight proven through successful mission operations</td><td rowspan="3">3 (Production Stage)</td><td rowspan="3">Know How</td><td rowspan="2">Know How (Limited to Tooling and Manufacturing/ Drawing/ Specifications)</td></tr>
<tr><td>8</td><td>Actual system completed and flight qualifies through test and validation</td></tr>
<tr><td>7</td><td>System prototype demonstration in operational environment</td><td>May or may not be made available by Foreign Company</td></tr>
</table>

Stages of Design and Technology Readiness

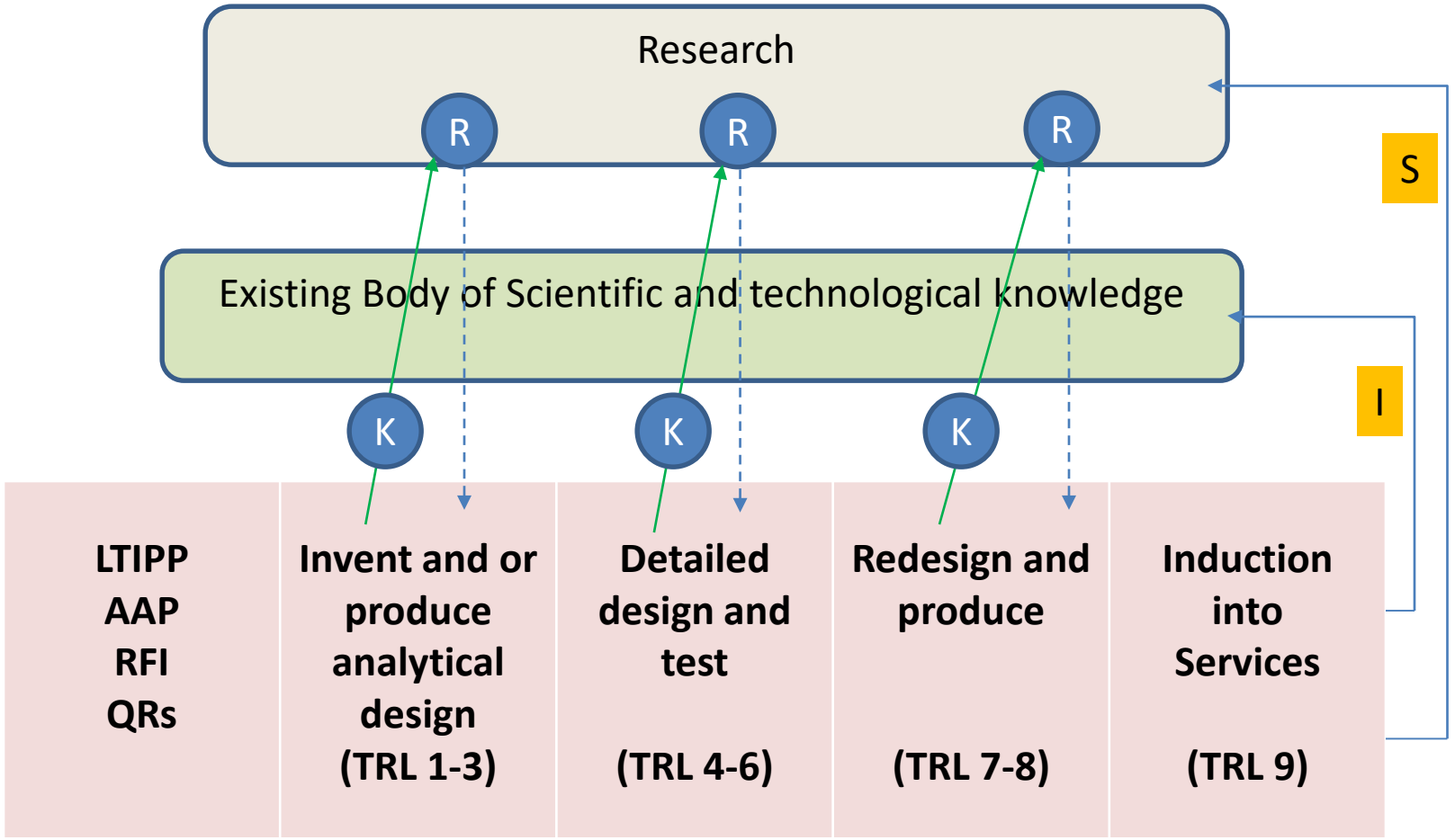
Technology Readiness Level	Design Stages	Time Period (Years)	"MADE IN INDIA"	"MAKE IN INDIA"
9	Sealed Design Particulars	**3 (Production Stage)**	**Know How**	**Know How (Limited to Tooling and Manufacturing/ Drawing/ Specifications)**
8	Manufacturing & Tooling Design			
7	Qualification/ UET			**May or may not be made available by Foreign Company**
6	Prototype production and trials in Field	**12 (R,D&T Stage)**	**Know Why Remains in India & Adds Value to National Security**	**Remains with Foreign Company Hence a Vulnerability to National Security**
5	Prototype development and trials in Lab			
4	Detailed Engineering Design			
3	Preliminary Engineering Design			
2	Concept Design			
1	Sketch Design			

Components of Technology



Innovation Process

Chain linked model



I – Contribution of manufacturing sector - scientific research by instruments, machine tools and procedures technology
S – financial support of research by System in sciences underlying the system areas in processes anywhere along the chain

RTD 23 Nov 17

Background

- Need for reversal of ratio of import to defence production of 70:30
- ToT not forthcoming in BUY or BUY & MAKE
  - leading to dependency on foreign firms for spares
  - inability to conduct deep repairs imposing penalties on defence preparedness
  - results in exorbitant financial burden

Issues

- What are the issues in the basic document (LTIPP, FYP, AAP, QRs) based on which R&D organisation can undertake the development process?
- Development of proof of concept is a R&D org function. What are the issues we see in this area?
- The next stage is the development of a prototype. What are the issues at this stage?(financial and nomination issues, user & industrial interaction required and conduct of trials leading to used acceptance) – issue of timelines in various trials
- What are the issues in Production and post-production trials?
- Entry into Services and lifetime support issues.
- Upgradation – role of industry, DRDO and users.

Discussion points of RTD on 23 Nov

- Current documentation and procedure lead to RFI and RFP for foreign procurement
  - LTIPP in its current form provides no significant guidance for indigenous production
- Provisions and financial systems do not allow for domestic industrial capabilities to be built
- BUY and BUY & MAKE results in license production
- Dependence on OEM for upgrade or modernisation
- Inability to productionise domestically developed equipment
- Scaling up of production difficult
- Model for ATV and other successful projects needs to be studied and replicated for conventional acquisition