



# Quality Function Deployment

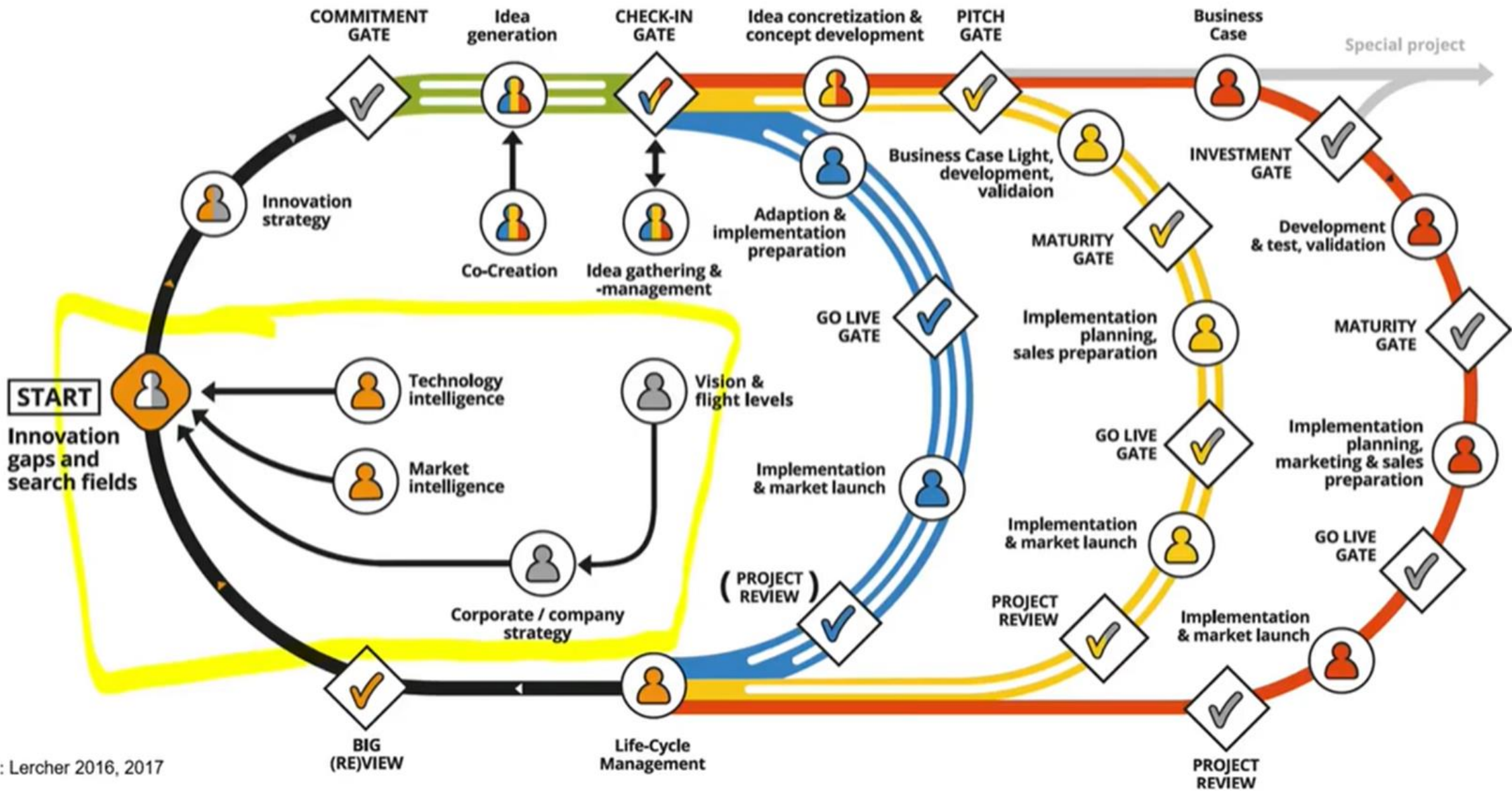




# Quality Function Deployment

## “Customer Driven Product / Process Development”

- **A system for translating customer requirements into appropriate company requirements at each stage**
  - from research and product development to engineering and manufacturing to marketing/sales**
  - and distribution**



Source: Lercher 2016, 2017



# When and where



- 1 Customers are complaining or aren't satisfied with your product or service.
- 2 Market share has been consistently declining.
- 3 Extended development time due to excessive redesign, problem solving, or fire fighting.
- 4 Lack of a true customer focus in your product development process.
- 5 Poor communications between departments or functions.  
(Over-the -wall product development).
- 6 Lack of efficient and/or effective teamwork.





# From customer requirements to production requirements



**Customer Requirements**



**Company Measures**



**Part Characteristics (Design)**



**Manufacturing Process**



**Production Requirements  
(Day to Day Operations)**





# Expected results

- Fewer and Earlier Changes
- Shorter Development Time
- Fewer Start-up Problems
- Lower Start-up Cost
- Warranty Reduction
- Knowledge Transfer
- Customer Satisfaction





# Digital Tools supporting

## customer-centric innovation



- **Lead-user method:** lead users' needs will be the future demand of the market.
- **Brainstorming:** Generating many radical, creative ideas
- **Observations:** customers are observed in daily life personally
- **Simulations and visualizations**
- **Experiments** when we have different groups with different demands. The groups will answer the concrete questions, and the results can be compared and the conclusion can be drawn.
- **Living labs:** Cooperation with customers in company's laboratories and workshops. There is a created spaces that is similar to the customer's home.
- **Field test** products and services will be tested in a real-life context.
- **Focus groups:** a qualitative marketing research-method when 6-8 people take part in. There is a moderator who directs the process.
- **Customer group involvement** helps developers to find better solutions for customer's needs and problems.
- **Outcome based interviews** are targeted interviews, when the needs of the different customer groups can be identified, that do not reflect the demand of the market.
- **Questionnaire** when representative research can be conducted in order to gather statistical information.
- **Diaries** the consumers who test the product will make notes about the experiences.





# More digital tools...



- Internet, Company website
- Cloud computing services, Digital platforms
- Project management tools (e.g., Slack, Microsoft 365)
- Fintech (mobile banking, crowdfunding and online payments)
- Customer relationship management (CRM)
- Big data
- Knowledge management system (KMS), Enterprise resource planning (ERP)
- Artificial intelligence (A.I.)
- Digital manufacturing (computer-controlled manufacturing processes, 3D printing, robot technology)
- Internet of things (IoT), Augmented reality, virtual reality
- Blockchain technology, Distributed ledger technologies (DLTs)

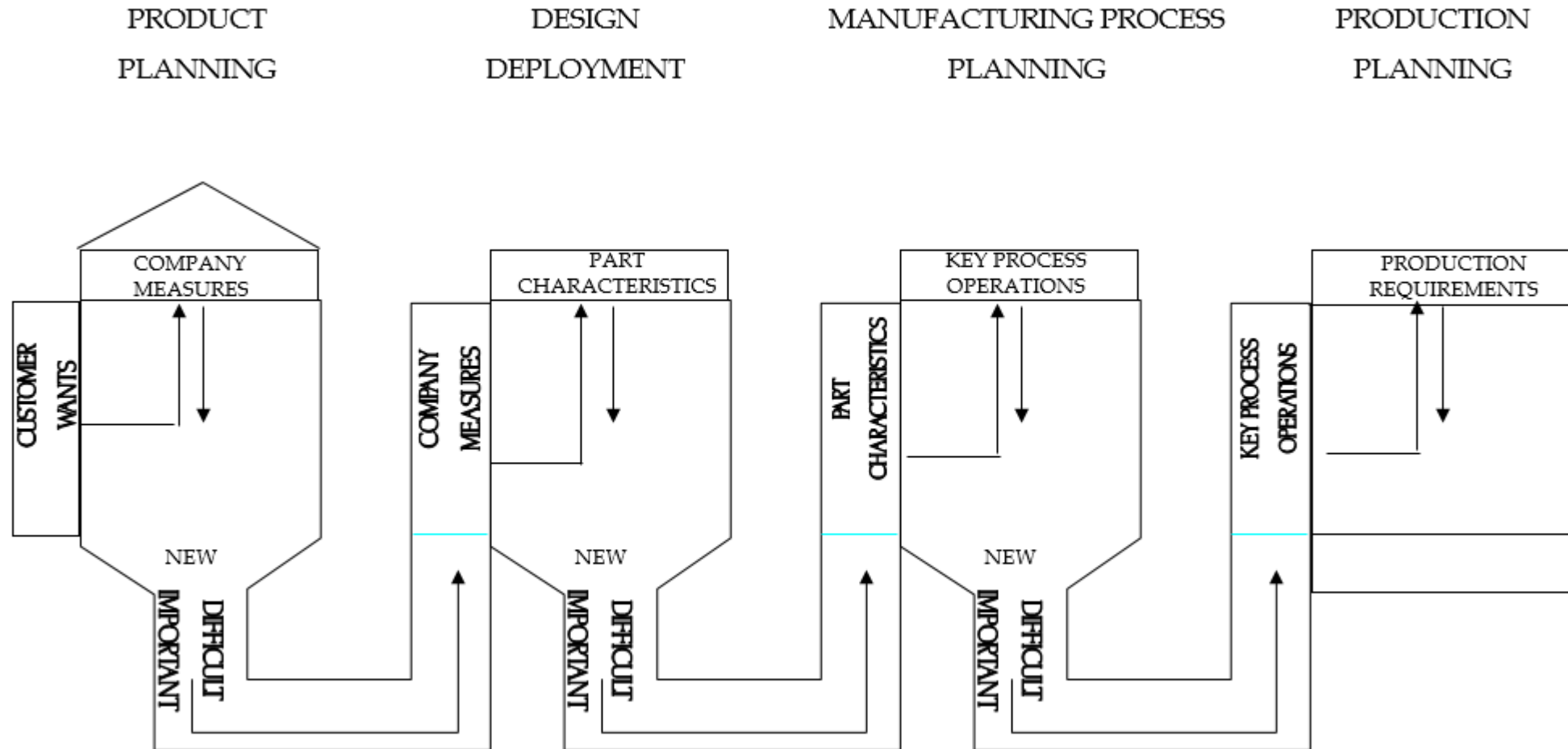
- E-mails, newsletters
- Social media platforms (e.g., Facebook, Instagram, LinkedIn)
- Online advertising tools (e.g., Google Ads, Facebook/Instagram Ads), Mobile and banner advertising
- Interactive company website, Questions and request
- Mobil apps, Chatbot
- Google forms
- Content marketing strategy (e.g. forums, blogs)
- Google My Business
- App Store, Support team
- Gamification tools





# Phases of QFD:

## deploying the „voice of the customer“





# QFD Process 1st step

## Voice of the customer

### WHAT

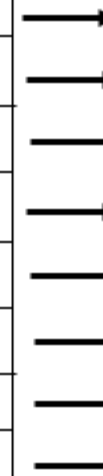

The items contained in this list are usually very general, vague and difficult to implement directly - they require further detailed definition.

One such item might be *good ride* which has a wide variety of meanings to different people.

This is a highly *desirable* product feature, but is not *directly actionable*.

## Translating for action

### WHAT

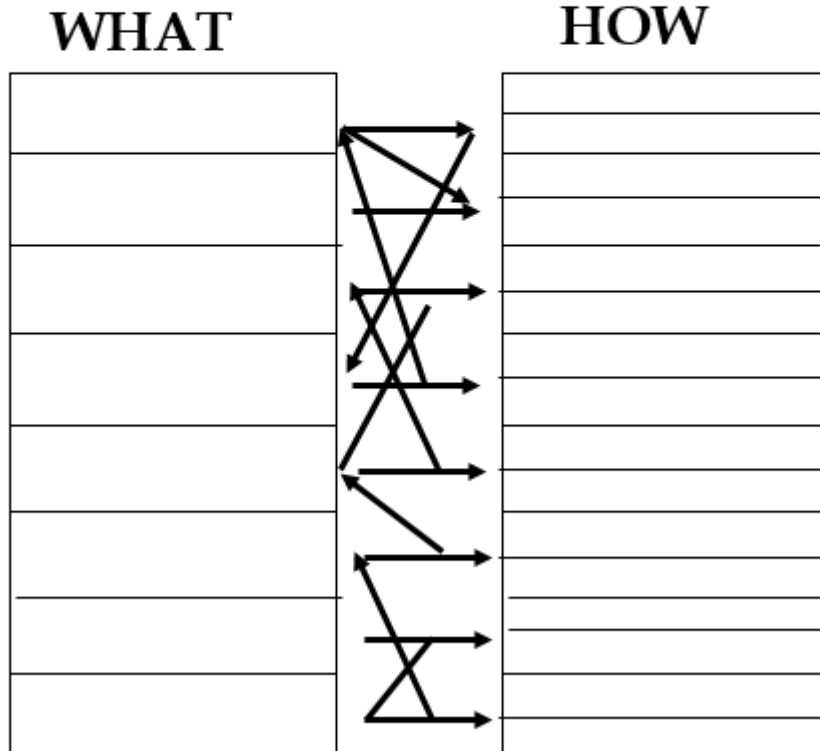



### HOW

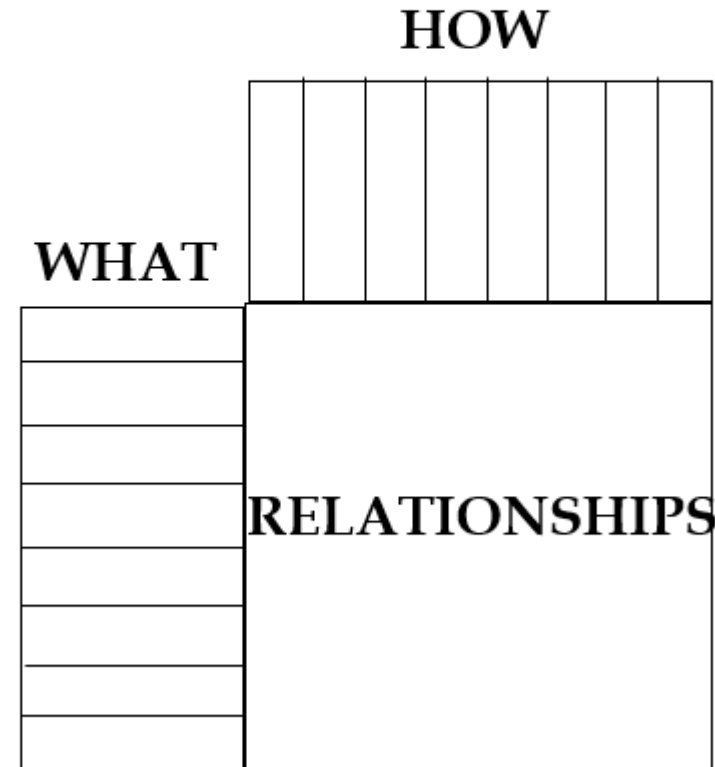



# QFD Process 2nd step

**COMPLEX  
RELATIONSHIPS**



**UNTANGLING  
THE WEB**





# QFD Process 3rd step

WHAT Customer Wants (CTQs)	HOW 'Process / Product'							
	○	◎				△		
		○				△		
		△	○			△		
			○					◎
		○			○			
		◎			○	◎		
	◎					△		◎

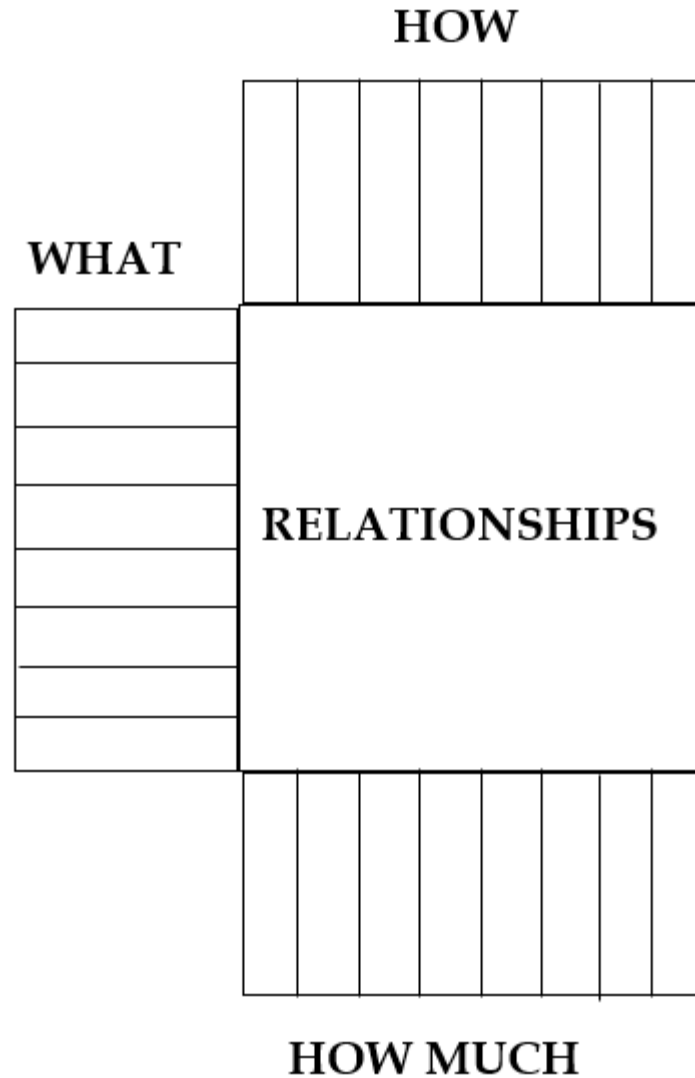
## Kinds of Relationships

- ◎ STRONG relationship
- MEDIUM relationship
- △ WEAK relationship





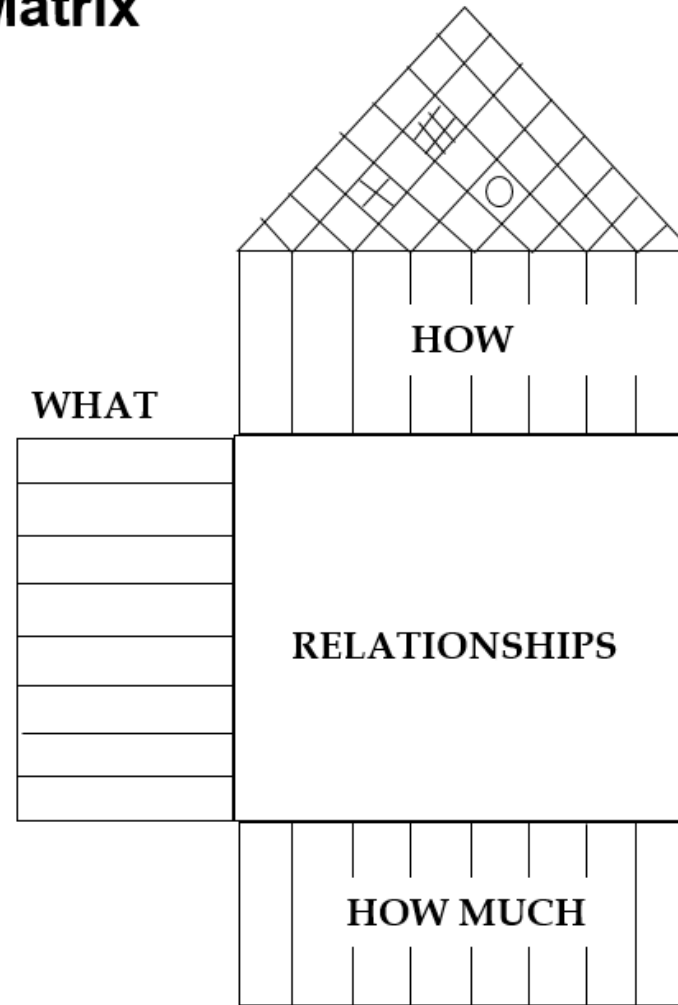
# QFD Process 4th step





# QFD Process 5th step

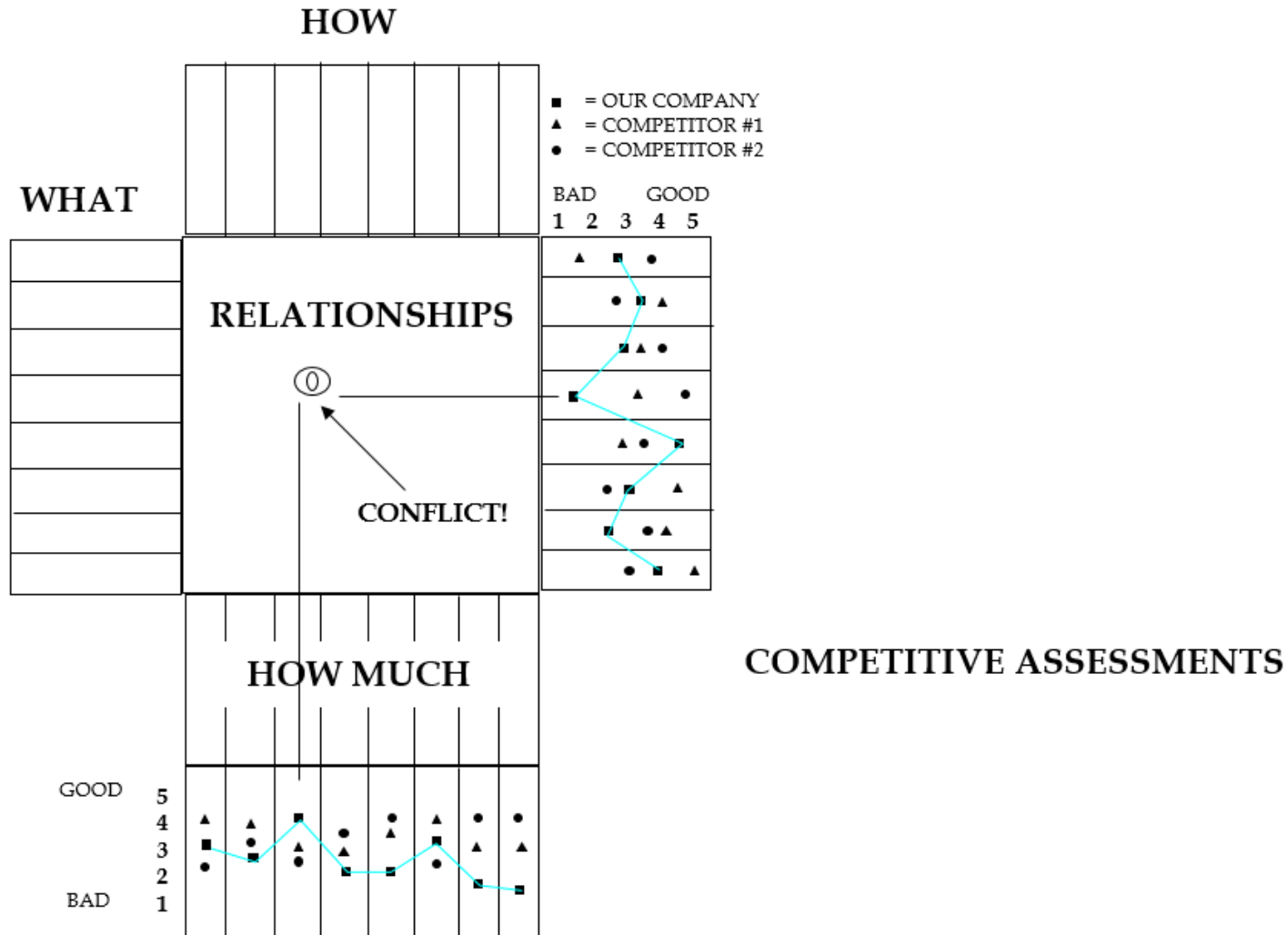
## Correlation Matrix



- ⊙ Strong Positive
- Positive
- × Negative
- ⊗ Strong Negative

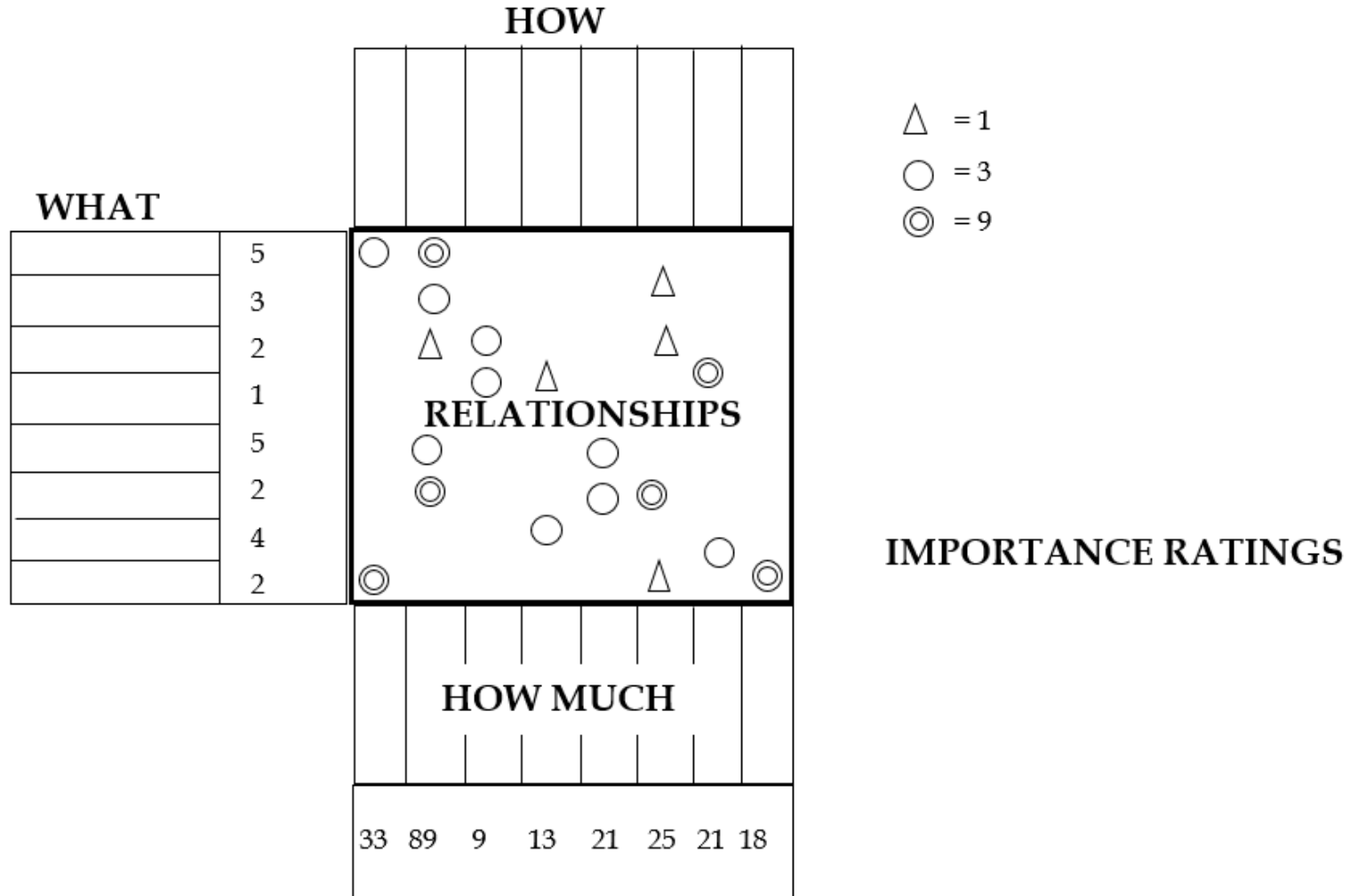


# QFD Process 6th step





# QFD Process 7th step







# What is needed 1

- **Understand Customer Desires**

Many times, customers need outside perspective to discover what they really need to build their product or process. The goal is to understand customers perhaps even better than they understand themselves so as to open their eyes to ideal solutions.

- **Understand Customer Priorities**

During the interview stage, get to know customer needs, but then break those needs down into prioritized parts. For example, if a customer is building drones for media production, how important is battery life compared to camera quality? How important is aesthetic compared to quality of the drone body? Weights are assigned to each quality based on what is most important to the customer. How well each need is met is ultimately how the customer will judge your solution's value.

- **Departmental Buy-In**

Often, disagreement or misunderstanding between departments of a customer's organization can occur in relation to what is actually needed. Marketing may think that a drone with trending features is top priority, but engineering may think that overhaul of a problematic part is top priority. The process helps create a plan that addresses all true priorities and to which all departments can agree.

- **Translate Customer Desires Into Goals & Technicalities**

This is the heart of the QFD process where the recorded desires of the customer are ranked by priority and specific process and resource planning takes place. They are laid out onto a useful diagram labeled the House of Quality.



# What is needed 2

- **Specify Traceable Requirements**

Specific requirements for the execution of the customer's product or process should be laid out. The *how* and *why* questions should be answered in the plan—*how* are we meeting the client's requirements and *why* are we doing it this way? The written requirements and should be specific enough that their completion and success are traceable. One should be able to work forward and backward in the plan and determine easily whether or not the overall plan is being executed successfully. For example, if there is a question on *why* something is done a certain way, one should be able to trace back to the beginning of the process to the initial requirement that determined the process needed to meet that requirement.

- **Provide Structure**

It is easy for customers to jump all over the place stating what they desire and tossing out ideas. But, at the end of the day, your role is to hone in on what they want and provide a logical, executable, traceable structure to organize their ideas.

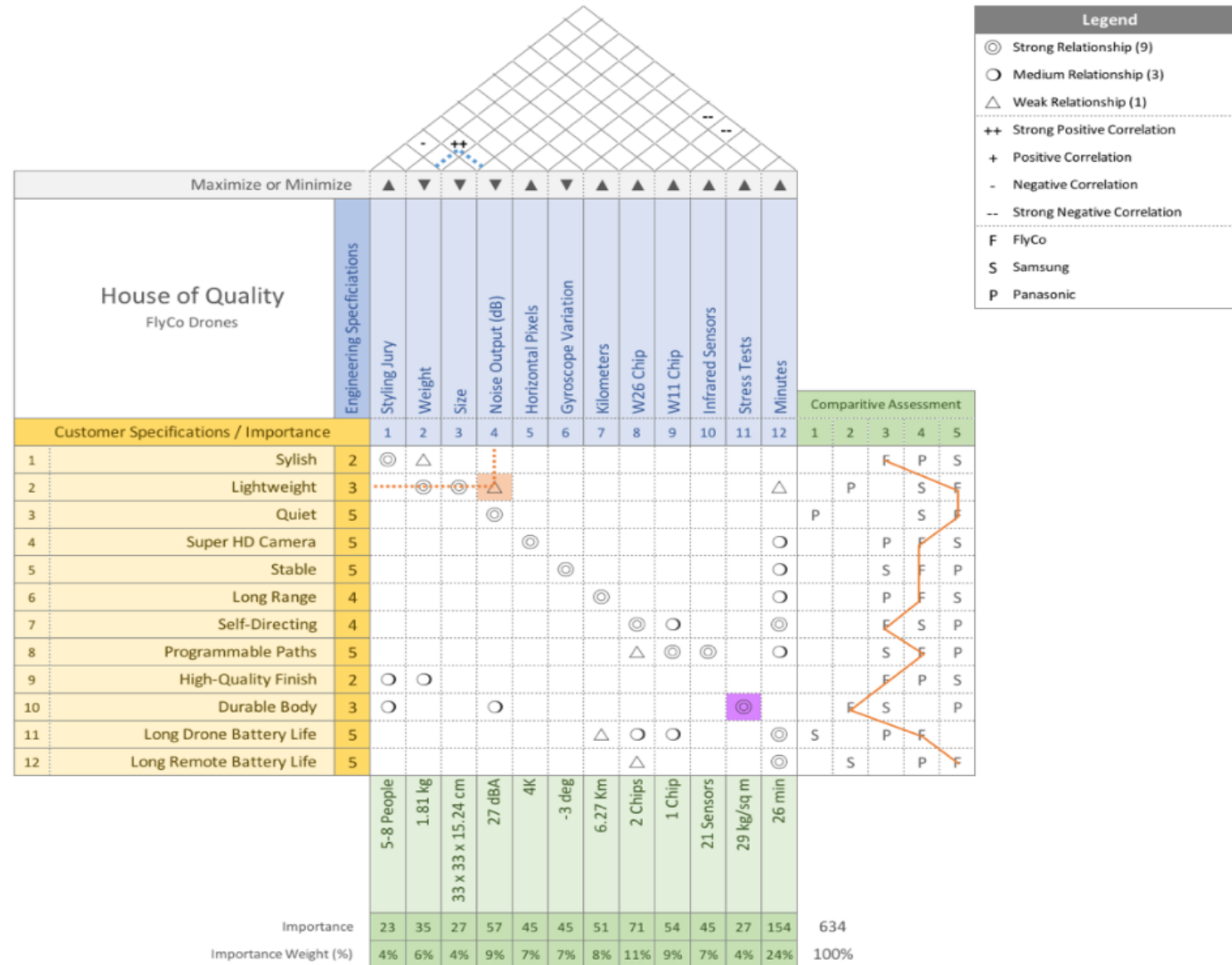
- **Allocate Resources**

Whether developing a physical product or creating a process for a customer, resources are needed to do so. Humans, machines, computers, construction materials, disposable materials and more must be accounted for. What do we have available to us and what do the available resources allow us to do? Answering these questions is a critical part of execution.





# Competitive assessment: drones





# Prioritized customer requirements: insurance service

**A = Strong positive correlation**  
**B = Positive relationship**  
**C = Negative relationship**  
**▼ = Strong positive correlation**  
**□ = Positive relationship**  
**○ = Negative relationship**

Customer Requirements			Product or Service Features											
			Response Time		Adjustor Staff			Settlement Process						
Primary	Secondary	Tertiary	Toll-Free Phone Number	24-Hour Staffing	On-Call Claims Representatives	Field Drafts	Certified Adjustors	Extending Geographic Coverage	Arbitration Process	Preliminary Finding Discussion	Claims Auditors			
Insurance Claims Service (Auto)	Speed	Able to Report Claim 24 Hours/Day	▼	▼										
		Claims Status Report in 2 Days		□	□	▼					□			
		Final Settlement in 10 Days			○			□						
	Accuracy	Professional Adjustors					▼							
		Settlement Review before Final Action								○	▼			
		Arbitration Option (Independent)								▼				





### Refrigerator Product Planning Matrix

Interactions:

- ⊕ Strong Negative
- ⊕ Moderate Negative
- ⊙ Strong Positive
- Moderate Positive

Goal	Priority	Compressor energy efficiency rating	Insulation efficiency	Noise measurement-front	Refrig. temp. range (on/off cycle)	Refrig. temperature variation	Refrig. cooling speed (from 30°C to 5°C)	Freezer temp. range (on/off cycle)	Freezer temperature variation	Freezer cooling speed (30°C to -15°C)	Volume efficiency (total/usable)	% Shelf & tray area adjustable	Drawer/shelf pull force	# of visibility features	Dis-assy & re-assy time for cleaning	% of features rated easy to clean	Freezer width	Refrigerator shelf depth & width	Freezer shelf height	Door tray depth	Warranty period (years)	Water filter replacement time & cost	10 year service contract cost	Time to disassb & reassh door	Refrigerator depth	Stainless & trim panel option prices	Focus group rating - appearance	Water temperature	Water filter indicator & life	Ice produced daily	Manufacturing cost	No. of adjustable temp. drawers	Competitive Evaluation (1-Low, 5-High)	Sales Points	Improvement Goal	Improvement Factor	Relative Development Effort		
Customer Needs	Priority	↑	↓	↓	↓	↓	↓	↓	↓	↑	↑	↓	↑	↑	↑	↑	↑	↑	↑	↑	↑	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	1	3	5					
Operation	Low energy consumption	4	U	U																												U	MGF	A	W	1.0	1.1	1	
	Quiet	1			U																												U	MGF	W	1.0	1.0	0	
	Maintains temperature	3		1																													FA	MVG	U	1.0	1.0	0	
	Preserves food & freshness	3			U																												U	MGF	W	1.2	1.0	0	
Storage	Maximize storage space	5																															U	MG	FA	W	1.1	1.4	5
	Flexibility for changing storage needs	3																															A	U	MVG	M	1.0	1.1	1
	Easy access & visibility	4																															U	FA	MVG	M	1.0	1.2	1
	Easy to clean	2																																MVG	FA	U	1.0	1.0	0
Reliab	Handles large containers & items	4																															U	MVG	MF	1.0	1.2	1	
	Reliable, doesn't break	5																															M	MVG	F	1.0	1.0	0	
	Easy & low cost to service	3																															U	MA	MVG	F	1.0	1.3	1
	Easy to deliver & install	1																																MVG	FA	U	1.0	1.0	0
Kitchen	Fits in kitchen space	5		U																													U	MVG	A	1.1	1.4	5	
	Coordinates with kitchen décor	4																																U	MFA	MVG	1.0	1.1	1
Disp	Dispenses purified water	3																																U	MFA	W	1.0	1.0	0
	Provides & dispenses purified ice	3																																U	MFA	G	1.0	1.0	0
↔	Low price	3																																M	MVG	FA	1.2	1.2	5
	Technical Evaluation (Italicized numbers represent subjective ratings)		U	M	W	G	F	A																															
	Target Value	5.8	150	34	3.0	3.0	2.0	2.0	2.0	2.0	110						300																						
	Technical Difficulty (1-Low, 5-High)	4	U	U	2	2	2	2	2	2	101						52																						
	Importance Rating	22	75	5	30	27	27	30	27	27	101						96																						

U - Us  
M - Maytag  
W - Whirlpool  
G - GE  
F - Frigidaire  
A - Amana

