HACCP
Hazard Analysis Critical control Point

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part 3

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HACCP : 7 principles of Codex Alimentarius

Principle n° 1 : Conduct a hazard analysis

- list all potential hazards associated with each step of the process,
- estimate the likely occurrence of hazards and severity of adverse effects,
- consider any measure to control identified hazard.

Principle n° 2 : Determine the Critical Control Points CCP(s)

Principle n° 3 : Establish critical limit(s) for each CCP

Principle n° 4 : Establish a monitoring system for each CCP

Principle n° 5 : Establish corrective actions in order to deal with deviations when occur

Principe n° 6 : Establish verification procedures to determine if the HACCP system is working effectively

Principe n° 7 : Establish documentation and record keeping

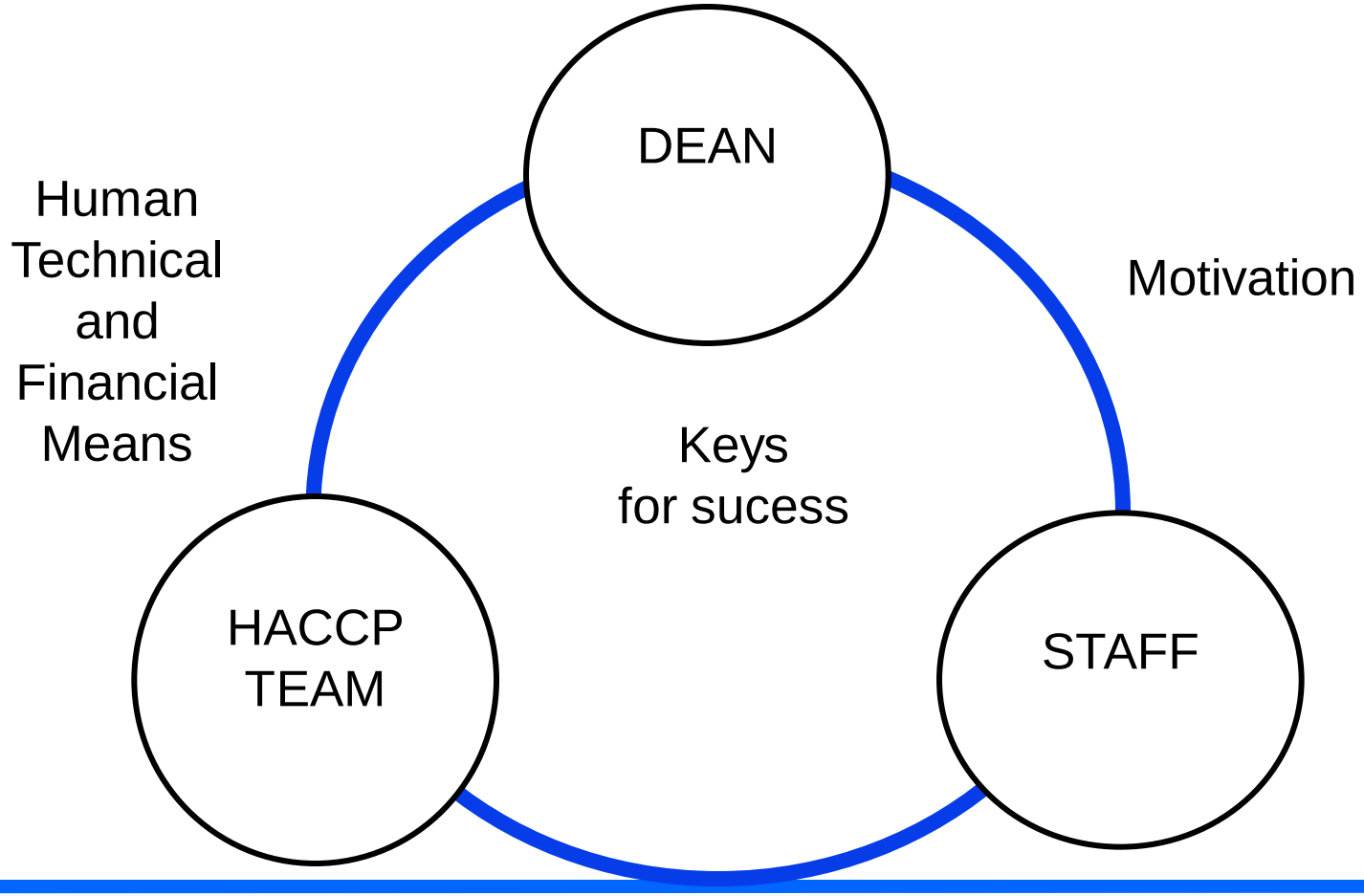
HACCP : 12 steps

1. Assemble HACCP team
2. Describe product
3. Identify intended use
4. Construct flow diagram
5. On-site confirmation of flow diagram
6. List all potential hazards, conduct hazard analysis, consider control measures
7. Determine CCP(s)
8. Establish critical limits for each CCP
9. Establish a monitoring system for each CCP
10. Establish corrective actions
11. Establish verification procedures
12. Establish documentation and record keeping

1rst steps

Prerequisites

Step1 : Assemble a multidisciplinary team H.A.C.C.P.



Step1 : Assemble a multidisciplinary team H.A.C.C.P.

« The food operation should assure that the appropriate product specific knowledge and expertise is available for the development of an effective HACCP plan »
(Codex Alimentarius Food Hygien Basics Texts)

On site or from other sources !

Ideally in the HACCP team :
One representative from the dean
One expert in microbiology
One responsible for the maintenance and sanitation in the plant
One from the production
One from the quality management team

Step 1 : Identify the scope of the HACCP plan

1 **One product**

2 **One hazard**

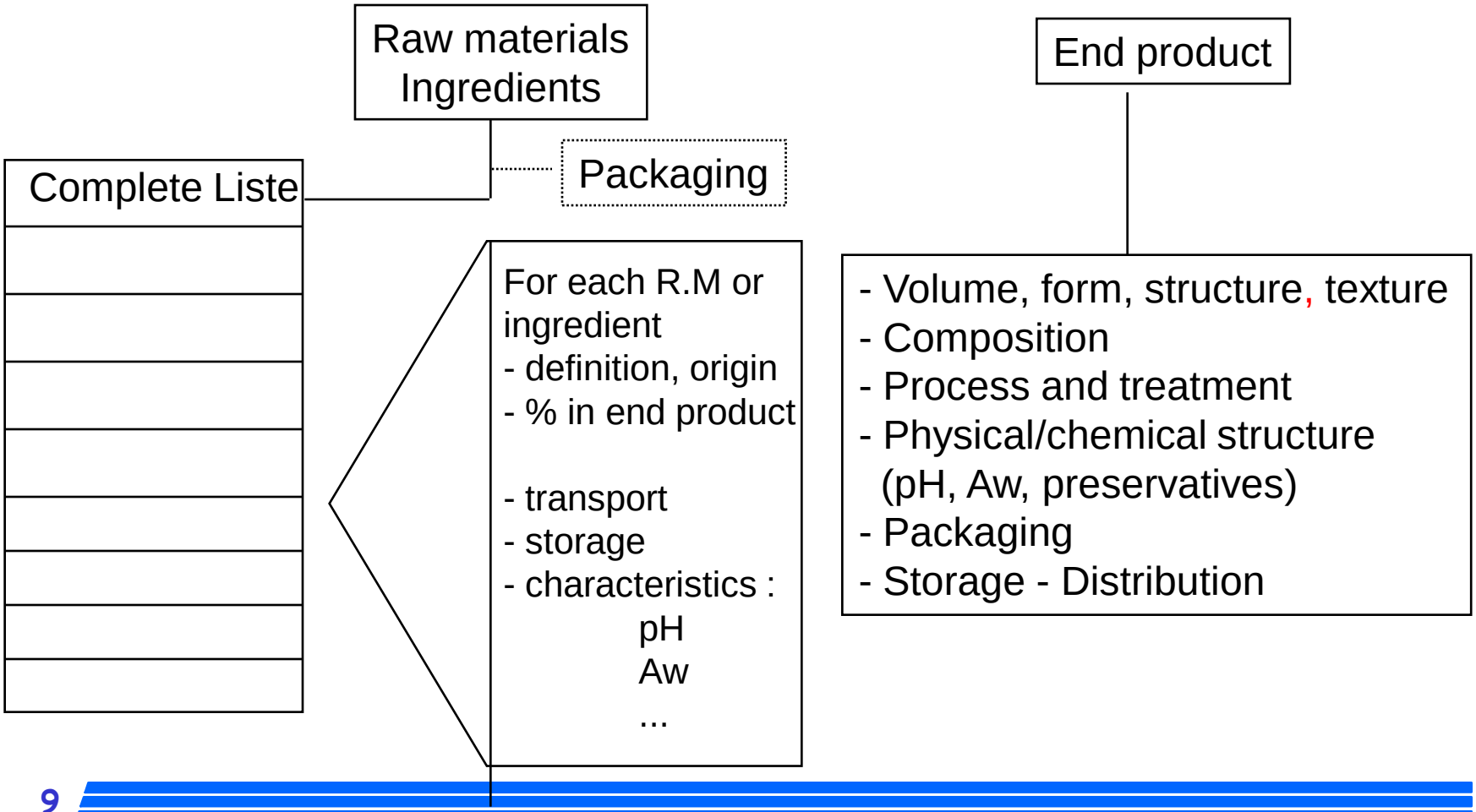
3 **One process**

Step 2 : Describe the product

A full description of the product shall be drawn up, including relevant safety informations such as :

- composition, physical/chemical structure (including Aw, pH...) microcidal/static treatments (heat-treatment, freezing, smoking...), durability
- packaging, mentions on the label necessary for traçability, storages conditions and method for distribution

Step 2 : Describe the product



Step 3 : Identify intended use

The intended use should be based on the expected uses of product by the end user or consumer, in normal or reasonnably foreseeable conditions, including the lengh

The product

The consumer

- Durability, shelf-life
- Temperature of storage

Intended use

Consumption

- Method of distribution
- Instructions for use

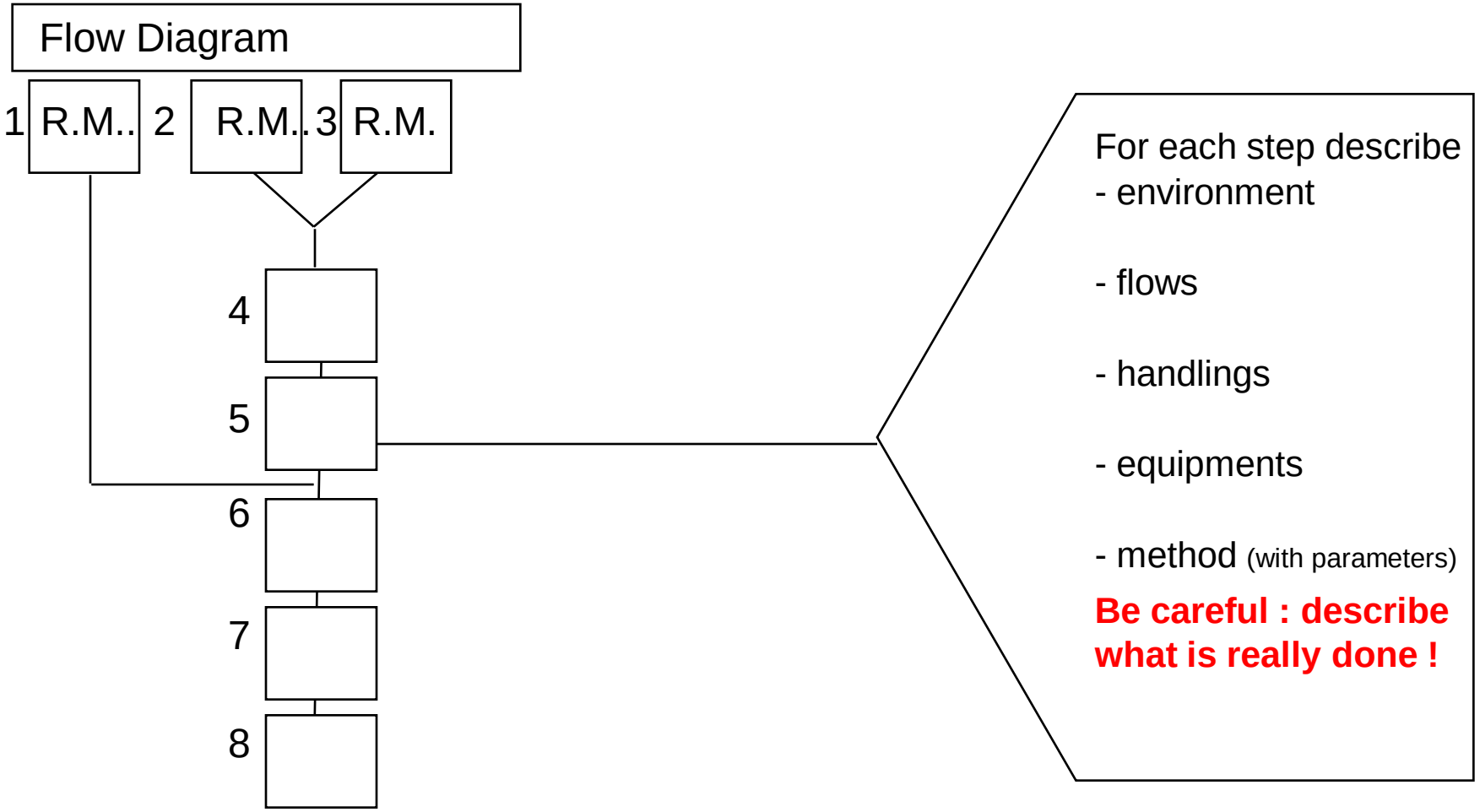
Foreseeable gaps

Steps 4 and 5 : Construct flow diagram and confirm (validation) on site

- Definition :

  Flow diagram : a systematic representation of the sequences of steps or operations used in the production or manufacture of a particular food item

Steps 4 and 5 : Construct flow diagram and confirm (validation) on site



Steps 4 and 5 : Construct flow diagram and confirm (validation) on site

Certains steps or important events may be forgotten :

- **A change of raw materials or of its structure (fresh to deepfreezed for example).**
- **Conditions of transfer from one step to an other or a short step in the flow diagram.**
- **Mention of a wait (usual or accidental) inside one step or between two steps**
- **Recycling of products.**
- **Change in the activities of the company**

Hazard analysis

Hazard analysis -Definition

The process of collecting and evaluating information on hazards, and conditions leading to their presence, to decide which are significant for food safety therefore should be addressed in the HACCP plan (Codex Alimentarius food hygiene basic texts)

hazard analysis = 3 steps:

- 1-List all hazard associated with each step
- 2- Analyse the hazards and select the most significant
- 3- List of measures which will eliminate or reduce hazards

Hazard analysis (1) : identification of hazards

Definition : hazard means a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect

Hazard analysis (1) : identification of hazards

- **Biological hazards** :. BACTERIA, MOULD, VIRUS, PARASITES, TOXINS

- **Chemical hazards :**

NATURAL TOXICS : histamine, mycotoxins

TOXICS COMBINED DURING THE PROCESS: nitrosamine

RESIDUS : antibiotics , heavy metals, pesticides, anabolic steroids, radioactive materials, additives, residus of cleaning and sanitizing products

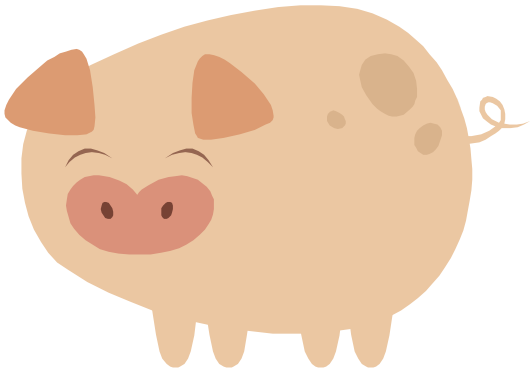
- **Physical hazards** :GLAS, METAL, BONE FRAGMENTS, INSECTS ...

- **All that can lead to an allergic reaction**

Hazard analysis (1) : identification of hazards

- History or problems met in the past
- Brain storming
- Data collection
- Process examination
- Ishikawa diagram...

- Presence ?
  Introduction ?
  Growth ?
  Survival ?



Hazard analysis (2) : identification of significant hazards

- = Assessment of significance of hazards

  Qualitative :

  Judgement on the risk based on the knowledge of the product/process, the likely occurrence/severity of the hazard and the likely abuse or use of the product

  Quantitative :
  Detailed studies based on knowledge of likely total exposure to specific toxic chemicals for example

Hazard analysis (2) : identification of significant hazards

Note	*Severity of the hazard (adverse health effect)*	Probability of occurrence	Probability of non detection
4	Very high	Very frequent	Very high
3	High	Frequent	High
2	Middle	Possible	Middle
1	Low	Rare	Low
The final note is a function of the 4 notes / criteria : *Minor 1 = 1x1x1* *Major 64 = 4x4x4*			

Hazard analysis (3) : List of measures which will eliminate or reduce hazards

HACCP team has to determine control measures which can reduce to an acceptable level or eliminate the identified and selected hazards

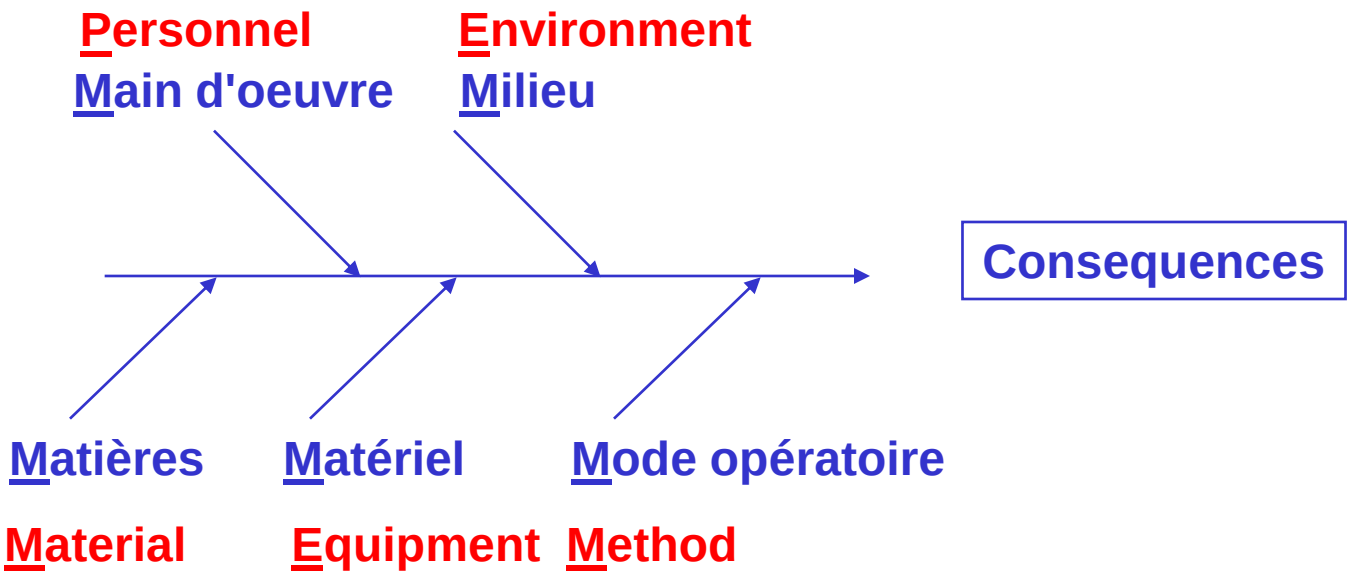
Hazard analysis (3) : List of measures which will eliminate or reduce hazards

HACCP team has , for each hazard and at each step of the process, to :

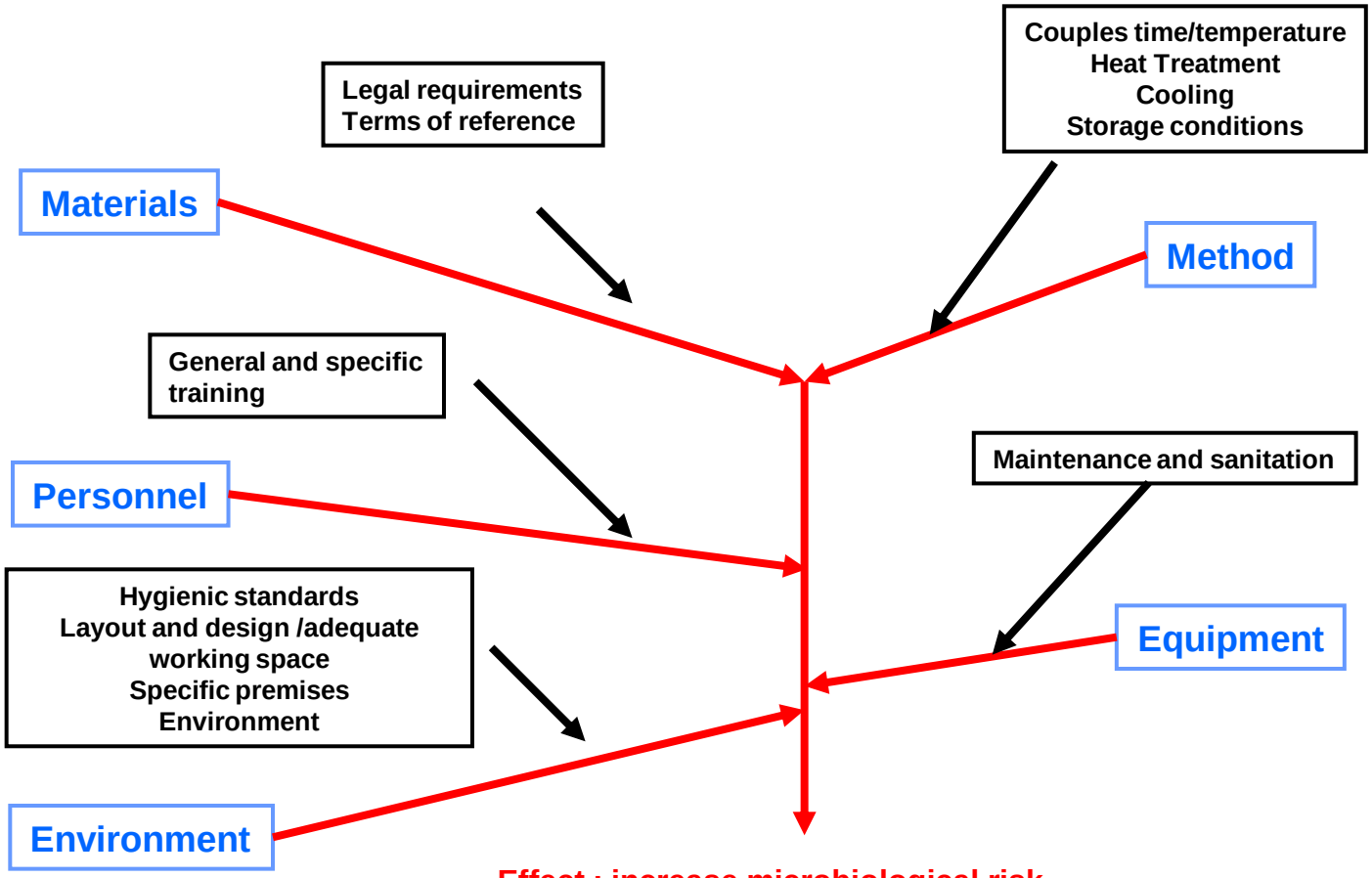
- estimate the likelihood of contamination due to raw material and during the process,
- estimate the importance of growth or elimination of bacteria,
- estimate the probability of survival or of toxins production, and the probability of introduction or persistence of chemical products or physical hazards.

Hazard analysis (3) : List of measures which will eliminate or reduce hazards

ISHIKAWA diagram (5M in french...but not in english!)



Hazard analysis (3) : List of measures which will eliminate or reduce hazards



Step	Hazard	Condition	Cause	Control measure
N…	Biological	Presence	Environment	
	Chemical	Introduction	Material	?
	Physical	Growth	People	
	Allergic	Survival	Method	
			Equipment	

Determination of CCP(s)

Determination of CCP(S)

Definitions (1)

Critical Control Point

A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

A step is a point, procedure, operation or stage in the food chain, including raw materials, from primary production to final consumption.

Determination of CCP(S)

Definitions (2)

Each CCP identified is defined through(NF V01-006 = french standard) :

- Control measures implemented to insure food safety
- Monitoring, that means a planned sequences of observations or measurements of CCP control measures
- Correctives actions to be taken when the results of monitoring at the CCP indicates a loss of control or trend towards loss of control
- The efficiency of the control measures must have been validated.
- NB : It is also very important to establish and maintain documentation for procedures and records. That point will be studied at the chapter "Documentation".

Determination of CCP(S)

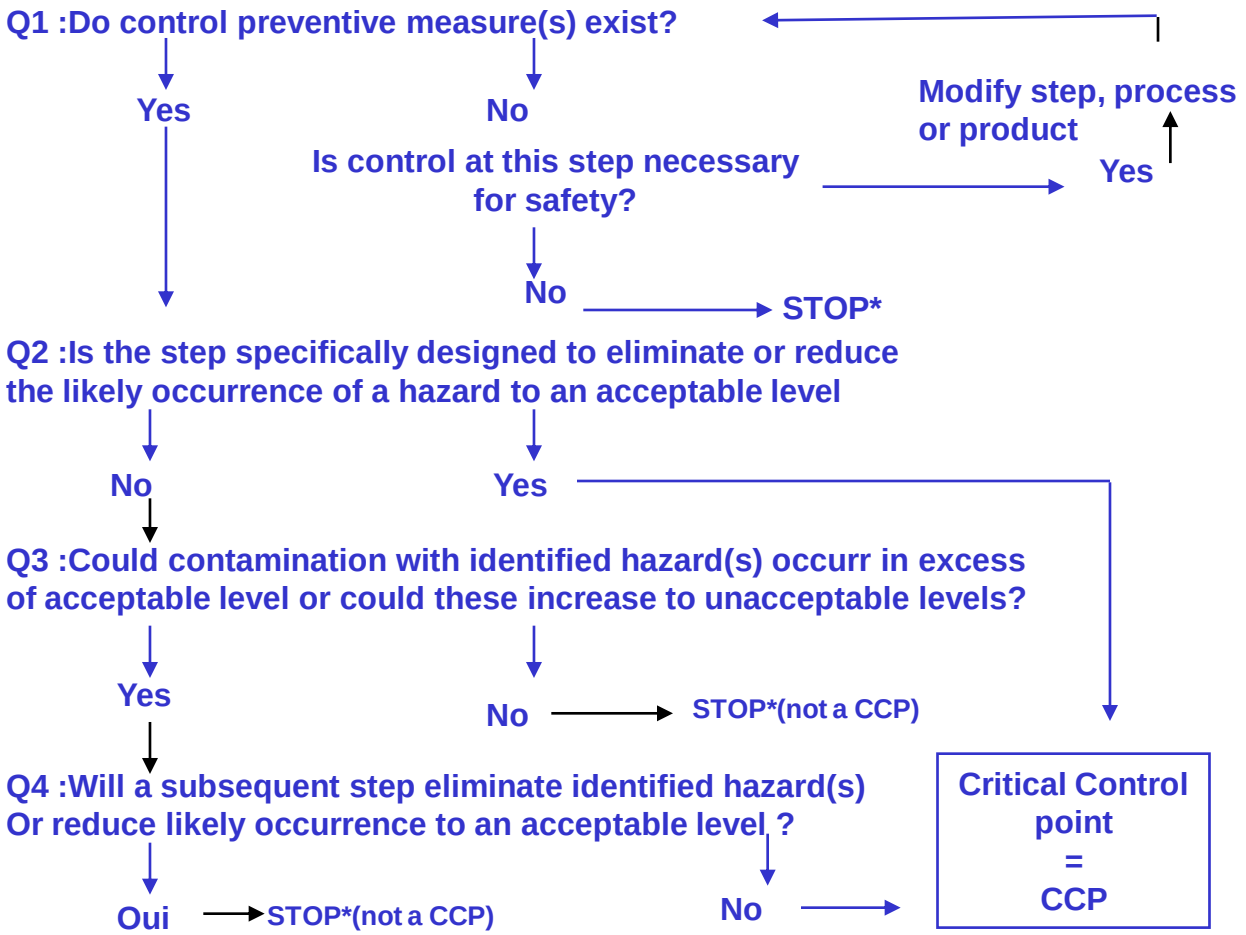
How to determine CCP(s) ?

- use professionnal judgement, habits, scientific texts, guides to good practices...

- application of a decision tree may be useful

Determination of CCP(S)- Decision tree (1)-

Decision tree for determination of CCP(s) on steps(Codex Alimentarius)



Step	Q1	Q2	Q3	Q4	CCP ?
N…	YES	YES			YES
N+1	YES	NO	YES	NO	YES

Determination of CCP(S)

- One example of wellknowed CCP : canned products

  with an heat treatment = 121,1°C 3 mn or equivalent
  12 decimale reductions (/10) of colonies of Clostridium botulinum
  probablity of 1 cfu in 1000 boxes of 1kg (1 for 10^6 g) if the contamination was 10^6 cfu /g before sterilization.

- And for raw milk cheeses, raw meat or raw vegetables ?

  NB1: CCP is often identified at the more risky step but that is not always right. In some cases, the more risky step in the flow diagram cannot be controlled, so it is not a CCP

  NB2 : CCP is defined linked to a step and an hazard

Determination of CCP(S)- Decision tree (2)-

Specific case of raw materials

The control of safety in raw materials is essential to insure food safety in end-product.

The user of raw materials must have written precise terms of reference about quality and prerequisites

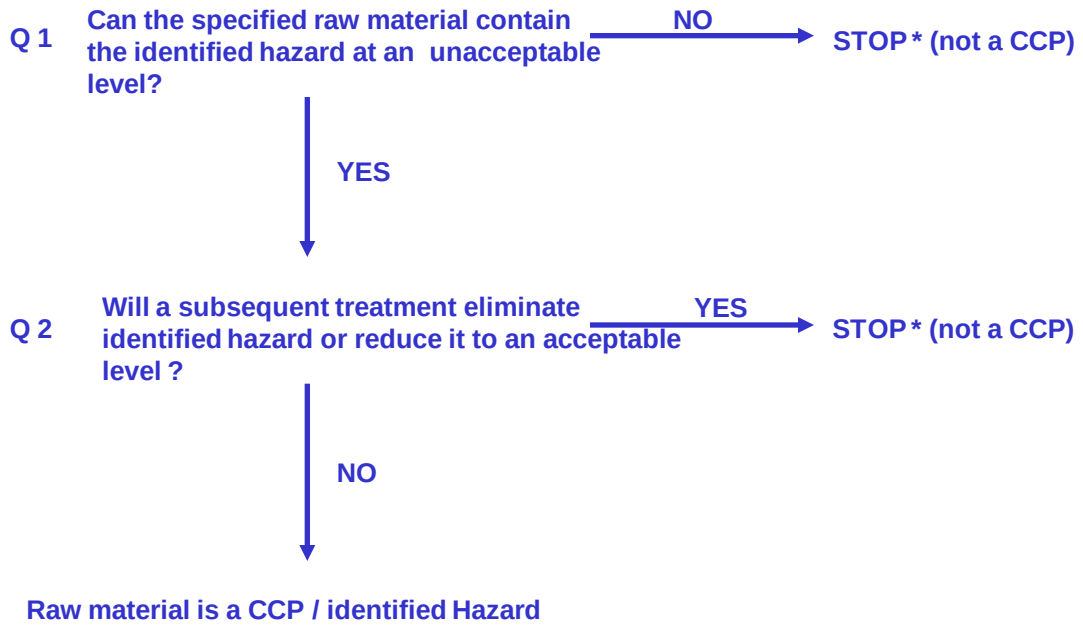
At the reception step, the user must have implemented procedures and actions to verify the compliance of raw materials with the terms of reference.

NB : Assessment of hazards linked with raw materials and control measures thereafter is an important part of the HACCP plan.

Determination of CCP(S)- Decision tree (2)-

Decision tree for determination of CCP(S) on raw materials

* Raw material : material received from outside or manufactured in the plant



Establishement of Critical limits for each CCP

Establish critical limits for each CCP

Definitions (1) -

Critical limit : a criterion which separates acceptability from unacceptability

Critical limits must be specified and validated for each CCP (/control measure)

Critical limits often used include measurements of temperature, time, moisture level, available chlorine, salt level, pH, Aw...
It may also include sensory parameters such as visual appearance or texture

For Codex Alimentarius critical limits should only be measurable but ,for EU Regulation 852/2004 (15), the requirement of establishing critical limits « does not imply that it is necessary to fix a numerical limit in every case « (flexibility).

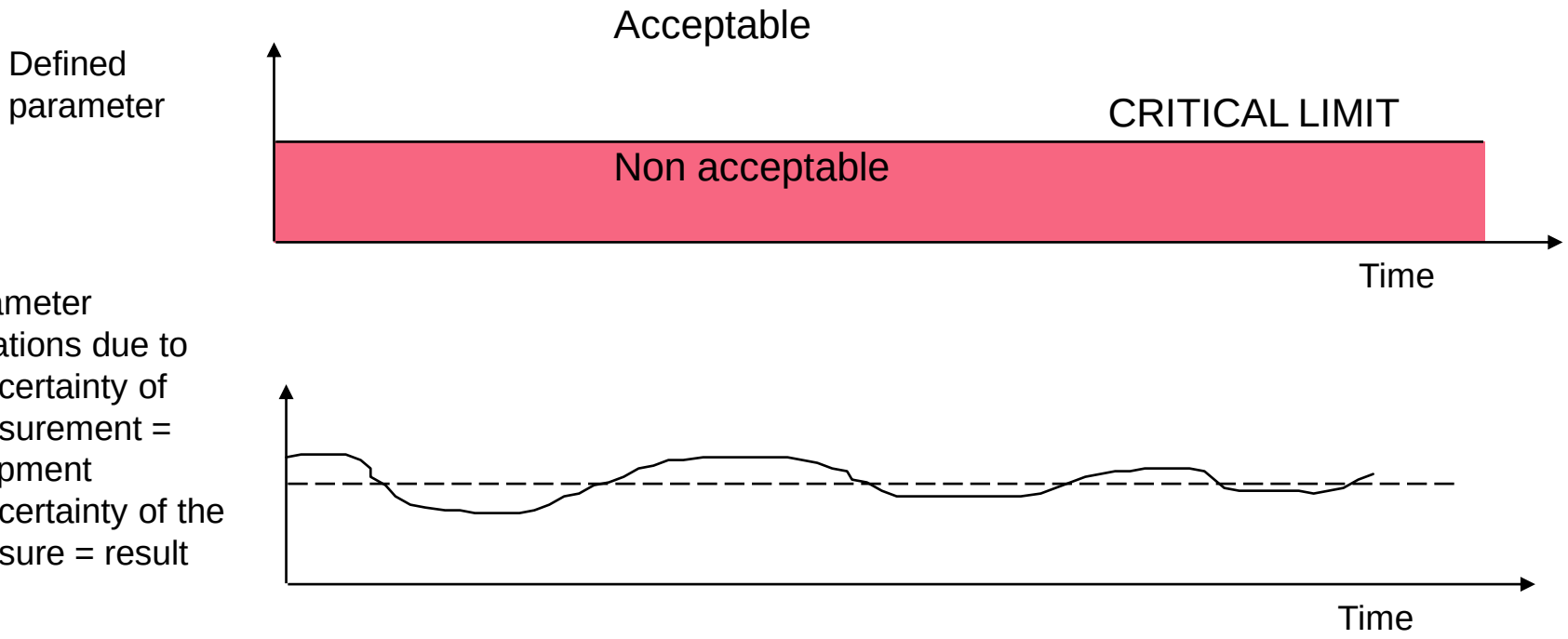
Establish critical limits for each CCP

Definitions (2) -

Critical limits can be extracted from a lot of origins : GMP-GHP guides, surveys, regulations , guidelines, quantitative risk assessments, ..

If determined by the team, they must be validated.

Establish critical limits for each CCP



N.B. Legal parameters must be taken into account as critical limits

Establish critical limits for each CCP

Definitions (3)

In some cases, to take into account the variability of process, it may be necessary to fix more stringent levels = target levels

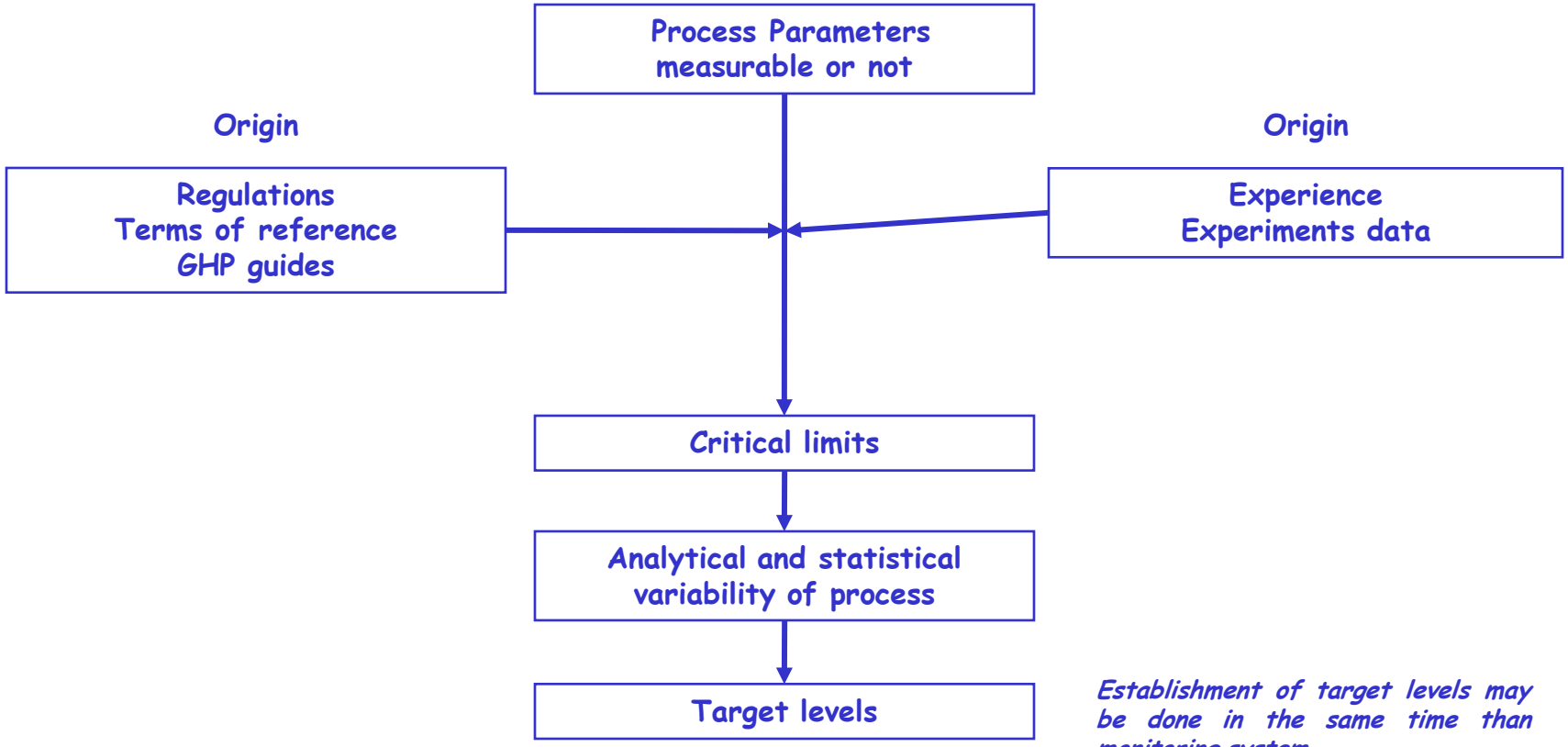
Target level : a predetermined value for the control measure which has been shown to eliminate a hazard at a CCP

Tolerance : The values between the target level and the critical limit

Deviation : failure to meet a critical limit

Establish critical limits for each CCP

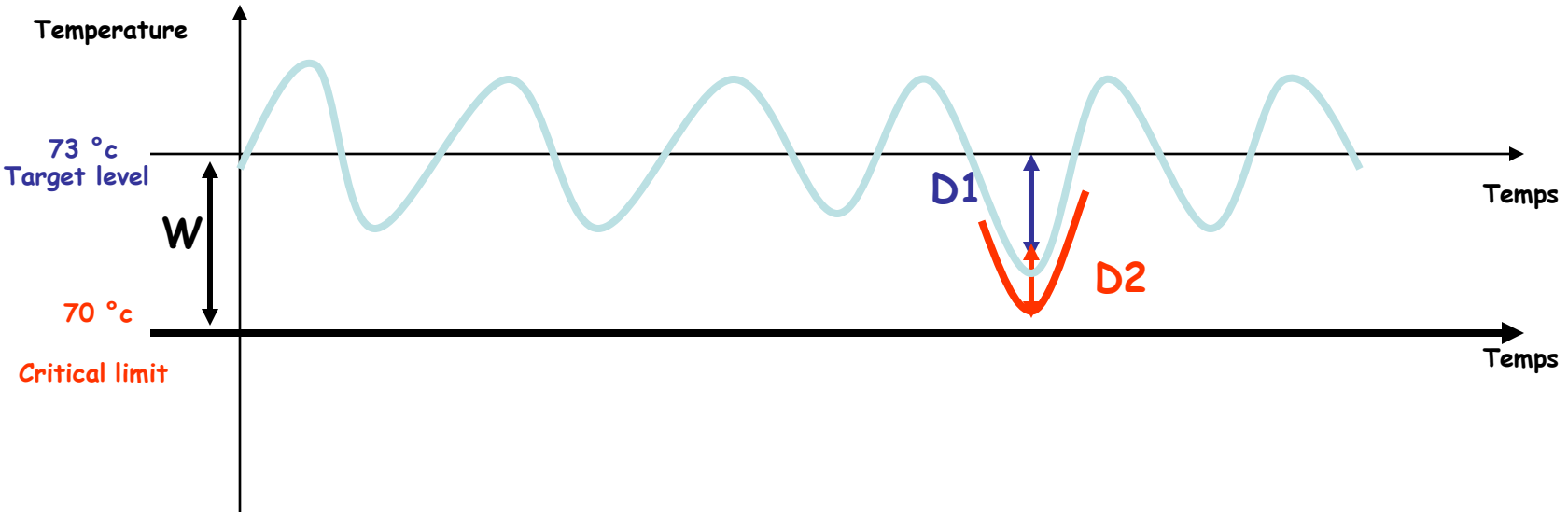
Synthesis



Establishment of target levels may be done in the same time than monitoring system

Establish critical limits for each CCP

Synthesis (example)



D1 : uncertainty on the measured value

D2 : uncertainty on the measure

D1 + D2 = Worst Case Scenario

CCP/Pack hygiene = flexibility -Regulation 852/2004 (recital 15)

- « In certain food businesses it is not possible to identify CCP(s).. »

- « in some cases, good hygiene practices can replace the monitoring of CCP... »

- «the requirement of establishing critical limit does not imply that it is necessary to fix a numerical limit in every case. »

- « the requirement of retaining documents needs to be flexible in order to avoid undue burden to very small businesses »

Consequences

Apply to processes without microcidal treatment :

slaughterhouses, sliced and minced meat, raw milk, sale by aunction of fishes...

Certains steps, essential to prevent or eliminate certain hazards, may be controlled trough qualitative critical limit (non numerical). Correctives actions may also be predetermined and implemented

Establish a monitoring system for each CCP

Establish a monitoring system for each CCP

Definitions (1)

It's the act of conducting a planned sequence of observations or measurements of control parameters to assess wether a CCP is under control (Codex Alimentarius)

Monitoring is the scheduled measurement or observation of a CCP relative to its critical limits .

The monitoring procedures must be able to detect loss of control at a CCP.

Further monitoring should ideally provide this information in time to make adjustments to ensure control of the process to prevent violating the critical limits.

Where possible, process ajustments should be made when monitoring results indicate a trend towards loss of control at a CCP.

Establish a monitoring system for each CCP

Definitions (2)

The adjustments should be taken before a deviation occurs.

Sampling plans, methods, procedures and actions for observations, measurements and tests should be precisely described.

Data derived from monitoring must be evaluated by a designated person with knowledge and authority to carry out corrective actions when indicated.

Establish a monitoring system for each CCP

Definitions (3)

Ideally, a monitoring system should be continuous, on-line, on 100% of the production and give the appropriate informations in time, to set corrective actions before the products have to be rejected.

In fact, a monitoring system is often not continuous (cost-benefit ratio /risk assessment),out-line.

The amount or frequency of monitoring must be sufficient to guarantee the CCP is in control.

Establish critical a monitoring system for each CCP

Formalization (1)

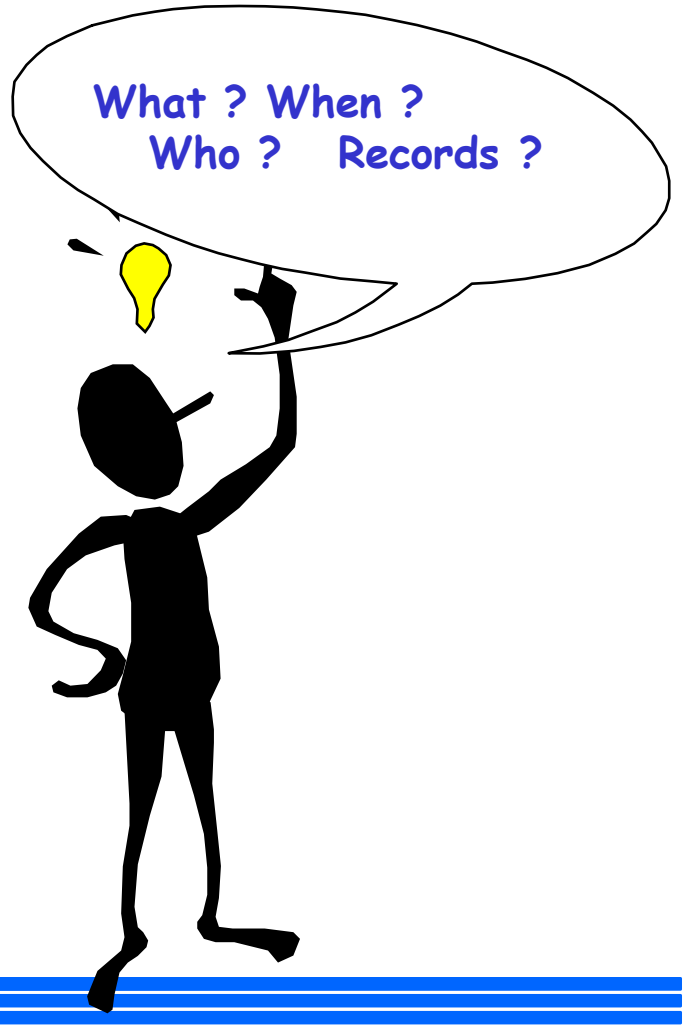
Most monitoring procedures for CCPs will need to be done rapidly because they relate to online processes and there will not be time for lengthy analytical testing.

Chemical and physical measurements are often preferred to microbiological testing because they may be done rapidly and can often indicate the microbiological control of the product

For example : dry sausage in France (indicator = weight to monitor first steps and the role of lactic flora / Salmonella)

Establish a monitoring system for each CCP

Formalization (2)



- nature, principle of the test
- frequency of the observation or measurement
- the site or the place where it's done
- standardized equipment
- methods
- sampling plans
- responsibilities for doing the monitoring, reviewing the results and deciding in case of deviation (all documents must be signed by a responsible involved)
- types of documents and records linked, retention time, documents control, audit once in use
- spreading of informations

Establish a monitoring system for each CCP

Formalization (3)

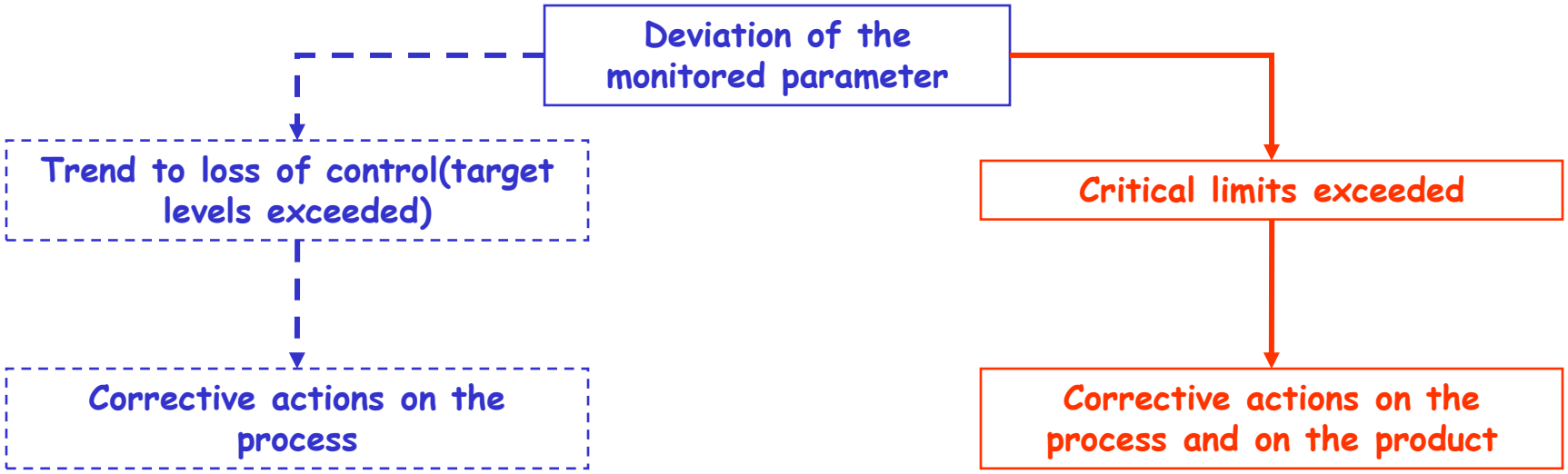
Procedures for monitoring system may mention corrective actions.

Correctives actions

Establish corrective actions

Definitions (1)

Any action to be taken when the results of monitoring at the CCP indicates a loss of control (Codex Alimentarius Food Hygien Basic Texts)



Establish corrective actions (the four parts of corrective actions)

Definitions (2)

- Deal with non-compliant products and insure that they have not been distributed (authority for product disposal or use)
- Correct cause of non-compliance
- Ajust process to maintain ou regain control (maintain records)
- Implement control measures to avoid new deviations

It's also necessary to precise identity of the person responsible for corrective actions

Establish corrective actions

Deviation and product disposition procedures must be documented in the HACCP record keeping

Establishment of verification procedures

Establish verification procedures

Definitions (1)

Establish procedures for verification to confirm that the HACCP system is working effectively, which may include appropriate supplementary tests, together with a review.

3 different aspects :

1- Verification of the application of methods, procedures, tests and other evaluations, in addition to monitoring to determine the compliance with the written HACCP plan (audit of HACCP system : e.g. "check the checkers«, review of records)

2- Validation = Obtaining the evidence that the elements of the HACCP plan are effective to eliminate identified hazards or reduce it to an acceptable level . (for example confirm that CCP are under control, measures done with standardized equipment, results of microbiological analysis satisfactory for raw materials, environment, end-products...).

3- Give confidence that the elements of the HACCP plan are up to date with technical innovation and relevant to control hazards (for example as regards technical and scientific documentation supporting parameters of heat-treatment used during the process).

Establish documentation and records

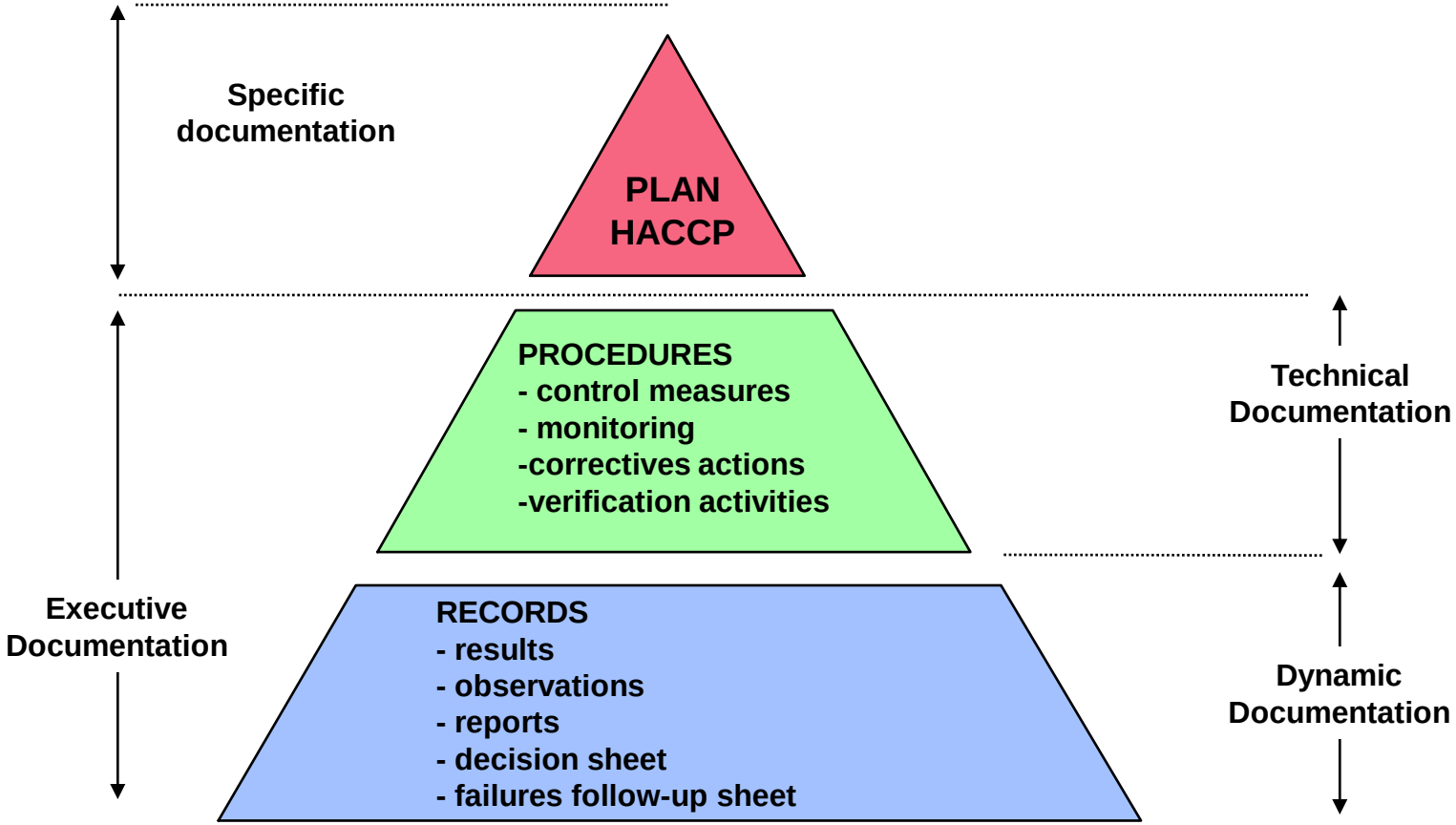
Establish documentation and records(1)

Establish documentation concerning all procedures and records appropriate to the 7 principles of HACCP and their application.

Examples of HACCP documentation :

- HACCP plan ← Key document
- Policy statement (approval)
- procedures and work instructions
- Control/monitoring records
- Corrective actions records
- Verification activities records
- HACCP team meetings reports

Establish documentation and records (2)



HACCP plan

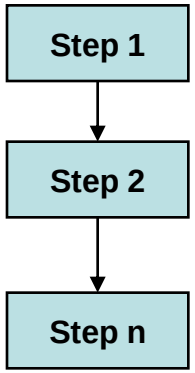
CCP	CONTROL MEASURES	PARAMETERS	MONITORING METHOD FREQUENCY	CRITICAL LIMITS	CORRECTIVE ACTIONS	PROC	REC

PROC = procedures references

a)control measures
b) monitoring
c) corrective actions

REC= records references linked to the implementation of a), b) et c)

HACCP method

Flow Diagram	Process	Product	Hazard
Ingredients and additives  	Parameters : numbers and assessment of their variability Temperatures, pH, Aw, Sterilization effect …	•Physical / Chemical characteristics • Microbiological characteristics • Packaging and effect on the durability of the product • Legal criteria? •Shelf-life? •Nutrition requirements? •Requirements for labelling?	• Microbiological hazards •Chemical hazards • Physical hazards • Allergens ?

Hygiene procedures:
- **•Cleaning and sanitizing,**
- **• Pest control,**
- **• People training**
- **• Temperature and transport conditions monitoring**

Own-check plan, traçability, recall plan(emergency procedures)

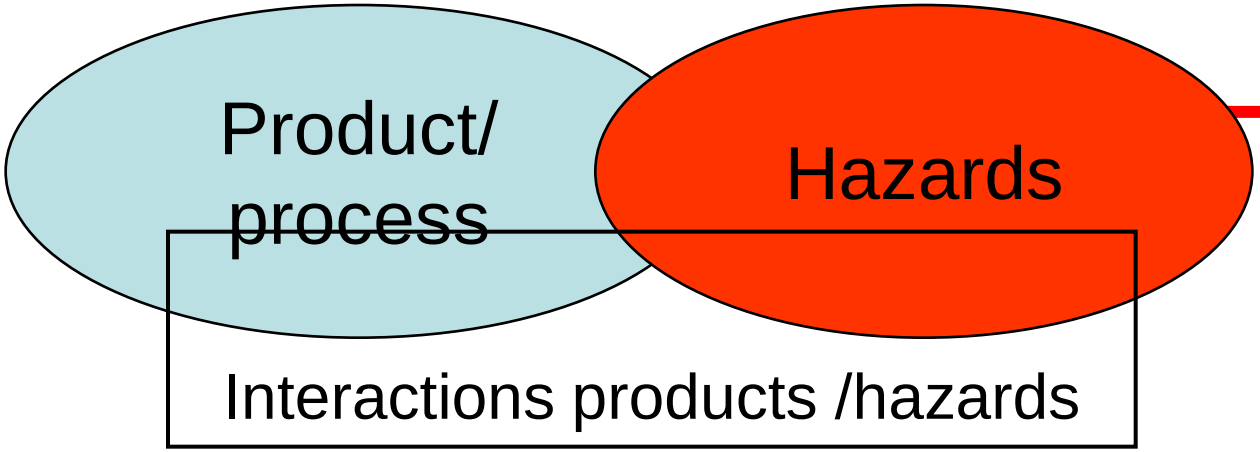
HACCP = Method -7 principles and 12 steps to control food safety

Specific of One product / One process manufactured in One Site

Key = hazard analysis

- Isolated or group implementation (GHP guides)
- Complete = biological, physical and chemical hazards
- Leads to CCP determination and control measures

Hazard analysis is done at every step of the food chain (even in primary production)



HAZARD ANALYSIS

Validated control measures

VALIDATION (before)

Tools for controlling their application and their efficiency

MONITORING (during)
VERIFICATION (after)

Corrective actions

Continual

- HACCP standards

With EU « pack hygiene » = flexibility

Development of international and private standards
- BRC Certification
- IFS Certification
- ISO 22 000

	Iso 22000	IFS	BRC
Type	International standard	private	private
Emetteur	ISO	HDE = Hauptverband des Deutschen Einzelhanders	BRC= British Retail Consortium
Characterization	Process standard Results obligation	Product standard Means obligation	Product standard Means obligation
Recognition	International	Distributors - in Germany - in France	Distributors - United kingdom - Italy - Swiss...

Iso 22 000 = 5 pilars

Regulation	PRP	HACCP Plan	Communication Traçability	Continual Improvement
Application Survey	GHP-GMP Layout Premises	Codex = Steps	Internal External Food Chain	

HACCP method

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- Certification
  - Certification Bodies

System Integrity via Certification Body Administration

GLOBALG.A.P signs service agreements with accredited Certified Bodies (CBs), which act as independent auditing companies. The agreements ensure a standardized high level of quality and integrity.

Accreditation of the certification bodies is done by Accreditation Bodies who have signed a Memorandum of Understanding with GLOBALG.A.P/FoodPLUS. Get a list of recognized Accreditation Bodies and more information here.

GLOBALG.A.P has established a global Integrity Program where all CBs are checked.

CBs are not permitted to support certified or controlled farms on a consultation basis and must have at least three years of product experience in the food industry.

The GLOBALG.A.P certification allows producers all over the world to demonstrate their compliance with the standard. Producers who wish to be certified can choose from the list of approved Certification Bodies (see below).

HACCP method

bout SQF | Standards | Suppliers | Buyers | Certification Bodies | SQF Professional | Training Centers | Documents | News | Events

ome > Standards

- Standards
- Ethical Sourcing
- Ethical Sourcing Materials
- SQF 1000
- Documents
- SQF 2000
- Documents

SQF Certification for Every Link in the Food Chain

The SQF Program provides two standards based on the type of food supplier: SQF 1000 for primary producers and SQF 2000 for manufacturers and distributors.

Within these two standards, SQF helps make certification more attainable for smaller companies by dividing the process into three steps: from Level 1, which incorporates fundamental food safety controls appropriate for low -risk products; all the way to Level 3, indicating a comprehensive implementation of food safety and quality management systems development.

In addition, SQF 1000 and SQF 2000 suppliers can further demonstrate their commitment to responsibly managing the food supply and its integrity by completing our Ethical Sourcing Module as a supplement to their SQF certification.

Resources

Downloads

SQF 1000 Code

SQF 2000 Code

Ethical Sourcing Brochure

Supplier Overview Brochure

Recent News

Welcome Robert L. Garfield – Senior Vice President – SQF Institute
Robert (Bob) L. Garfield joined the SQF Institute in October as senior vice president...

Reforming America's Food Safety System: Update on 510
History was made on January 4 when President Barack Obama signed Bill S.510 into law...

Definition of terms

- **H.A.C.C.P. (Hazard Analysis Critical Control Point) :** a system which identifies, evaluates, and controls hazards which are significant for safety

- **Hazard:** a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

- **Risk** : a function of the probabability of an adverse health effect and the severity of that effect , consequential to a hazard.

• **Critical Control Point (CCP):**
A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

A step is a point, procedure, operation or stage in the food chain, including raw materials, from primary production to final consumption.

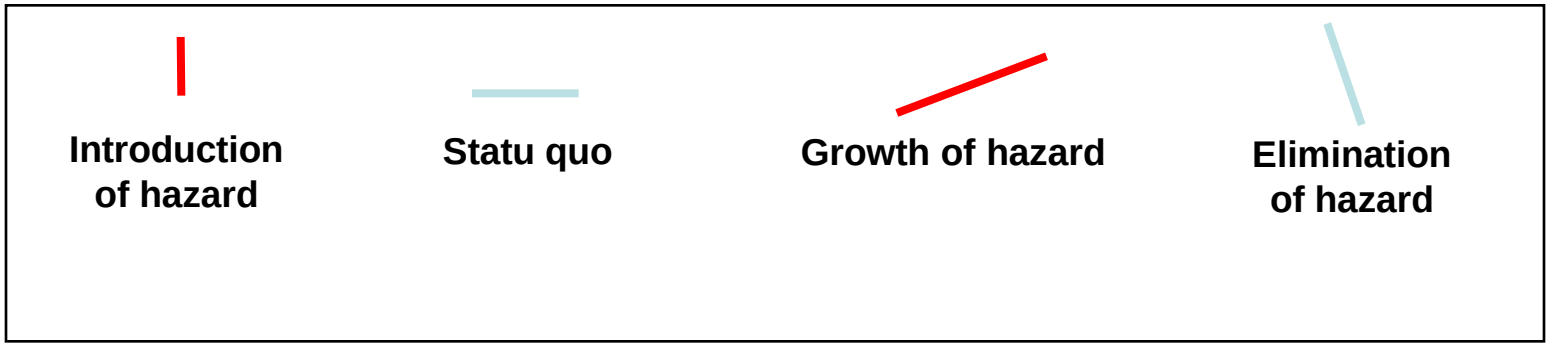
•**Control measure** : any action and/or activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

•**Corrective action** : any action to be taken when the results of monitorin at the CCP indicates a loss of control or a trend towards loss of control .

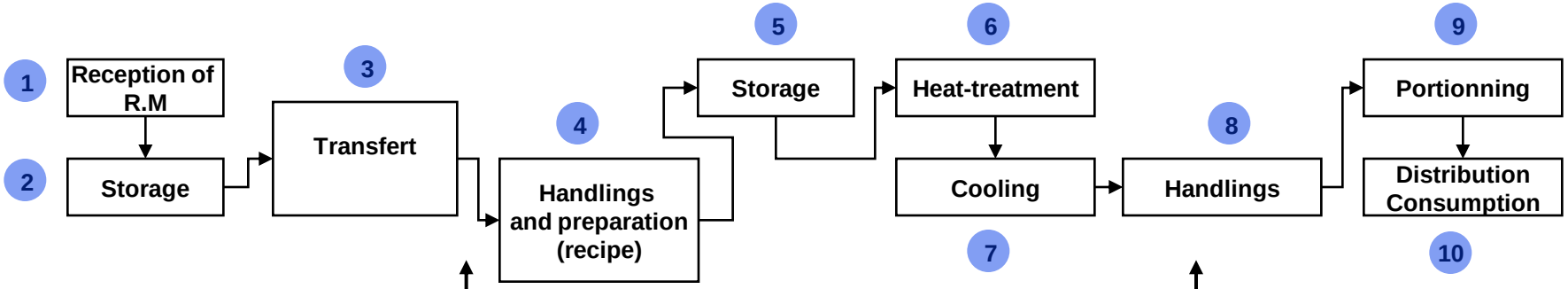
EXAMPLE

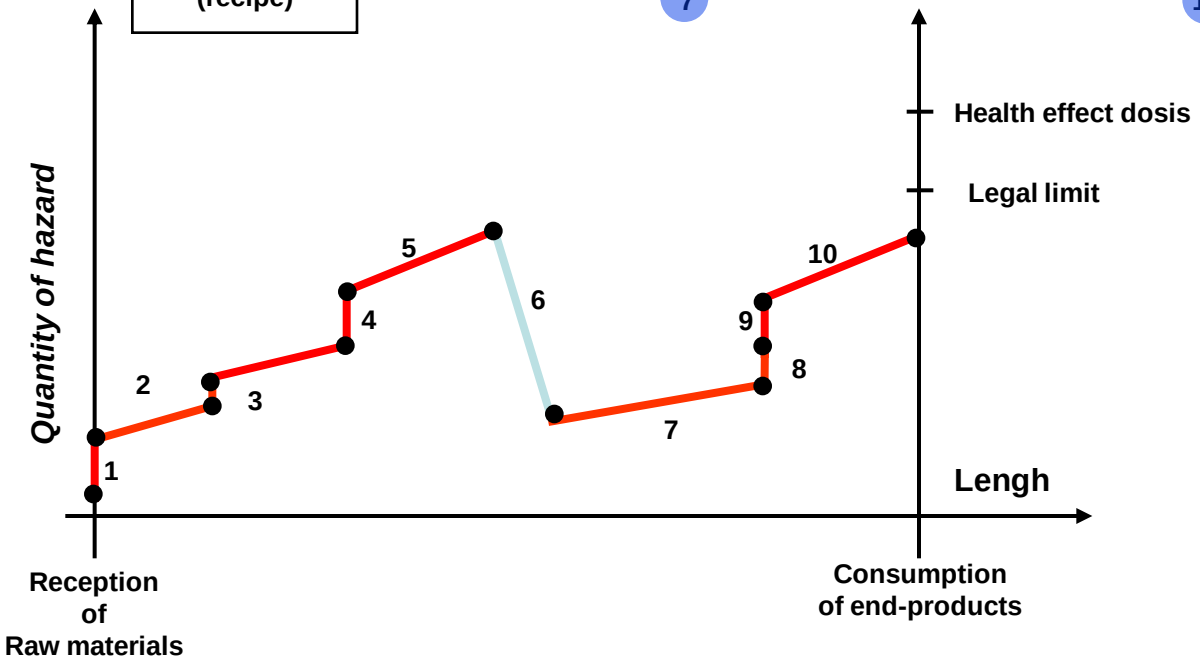
Every process can be representeted on a curve with, in abscissa the lengh of process and in ordinate the quantity of hazard in the food-stuffs at the time t

HACCP method

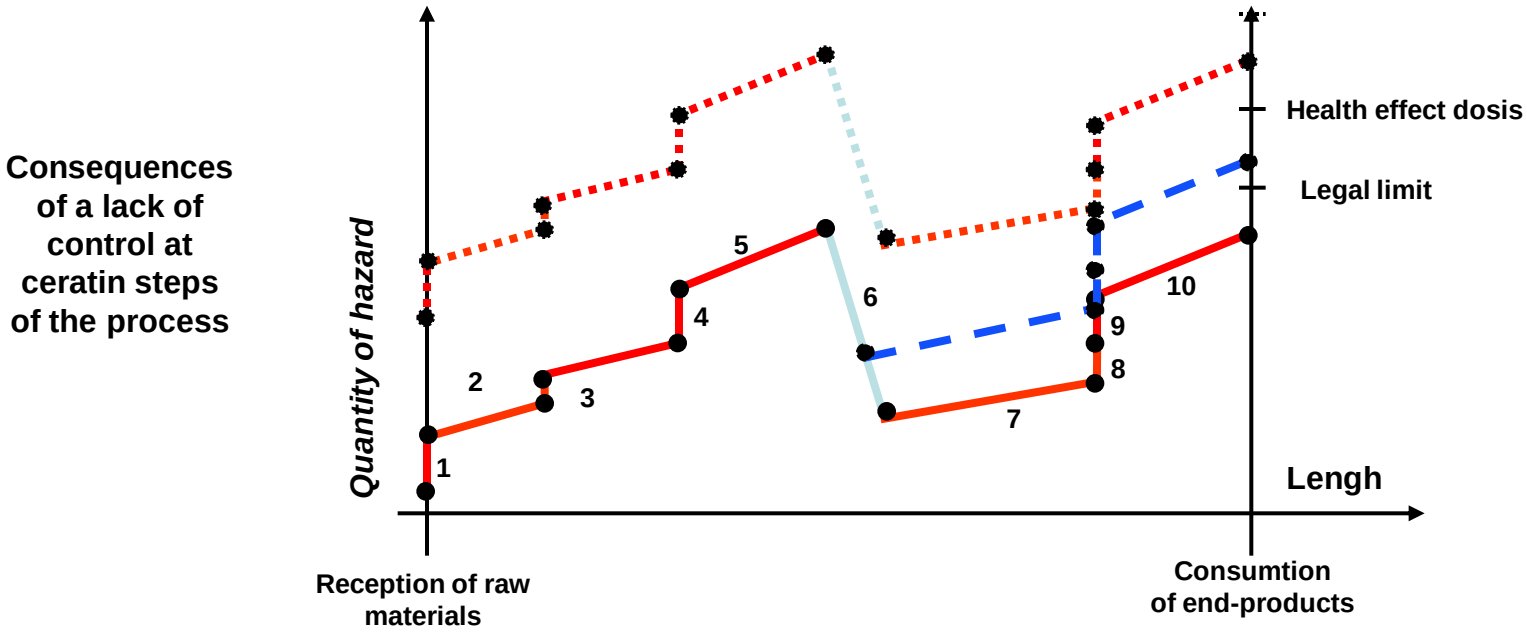


Example : Flow diagram of a cooked meal(2)





Example : Flow diagram of a cooked meal(3)



High level of contamination in raw materials	Process cannot reduce hazard to an acceptable level (risk of health adverse effect)
Bad parameters of heat treatment	Legal limit is exceeded

- **Starting point :** flow diagram and process control

- **Head point**: hazard analysis step by step
  Identification of conditions and causes
  Control measures

  Relevant HACCP studies

  Application and efficiency after

(Synthesis Codex)

Describe product and the intended use

↓

Describe process
Flow diagram

↓

Identify Hazards
Description and analysis

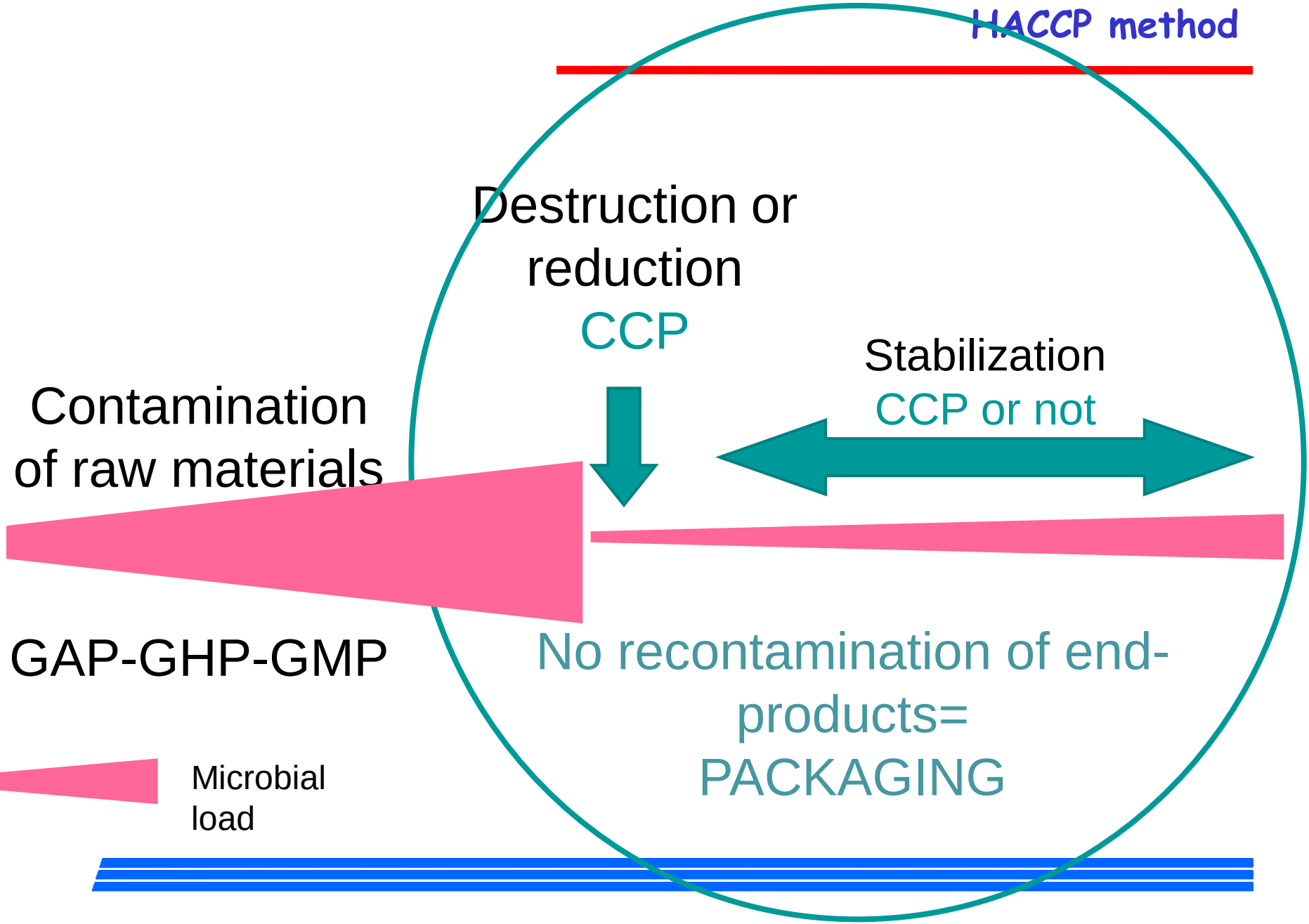
↓

Steps	Hazards	Control Measures	CCP	Monitoring system	Critical Limits	Corrective Actions	Records	References of instructions

Verification

Conclusions and résumé

- It's up to you !


Destruction or reduction
CCP
Stabilization
CCP or not
Contamination of raw materials
GAP-GHP-GMP
No recontamination of end-products= PACKAGING
Microbial load