

Unilever R&D and Vitality

- General Introduction -
Investor Relations Event

29-30 June 2004

*Unilever R&D Vlaardingen,
The Netherlands*



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All numbers in the presentation are in Euros translated at average 2003 exchange rates with the exception of balance sheet, cash flow and dividend numbers which are expressed at year end rates.

Content

- Introduction
- General overview Unilever R&D
- Contribution of R&D
- Organisational framework
- Operating model
- Recent changes



Introduction

- Science & Technology will be important drivers of Vitality
- The pressure is on for ever faster, more impactful innovations offering real tangible benefits for consumers and customers
- Unilever has leading R&D capabilities to make impactful vitality innovations in nutrition, hygiene and personal care



General Overview Unilever R&D

Unilever

Corporate Research
Safety & Environment Assurance Centre (SEAC)

Divisional R&D: Foods & HPC

6 central R&D laboratories

- 3 in Europe
 - 1 in US
 - 2 in Asia (India/China)
- supported by

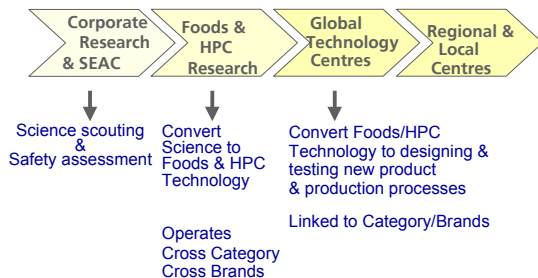
global technology centres & regional and local centres

Overall budget 1.1 bn€ (2.5%)

Contribution of R&D

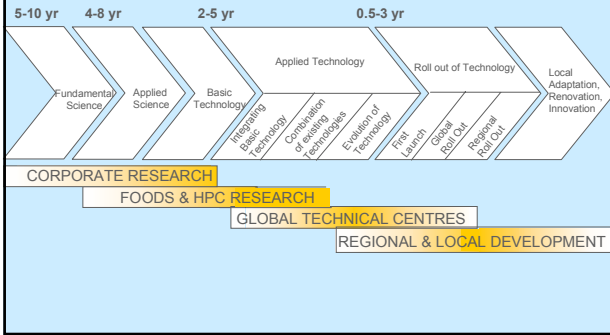
- 🔧 Insight into the needs and underlying motivation of consumers
- 🔧 Patent protected innovations
- 🔧 Safety of our products (SEAC)
- 🔧 Availability of raw materials
- 🔧 Ever stronger tangible product benefits, ever faster
- 🔧 New business systems

Organisational Framework

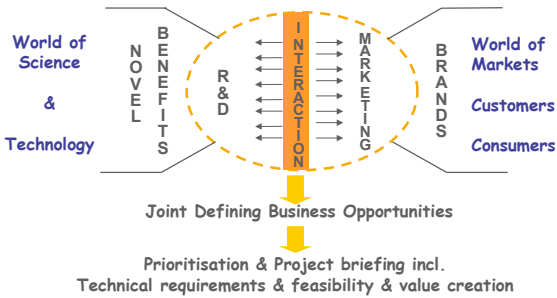


Organisational Framework - Value Chain

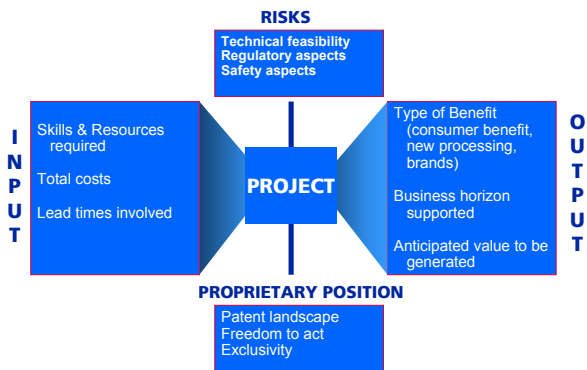
seamless connection between
fundamental science to product innovation



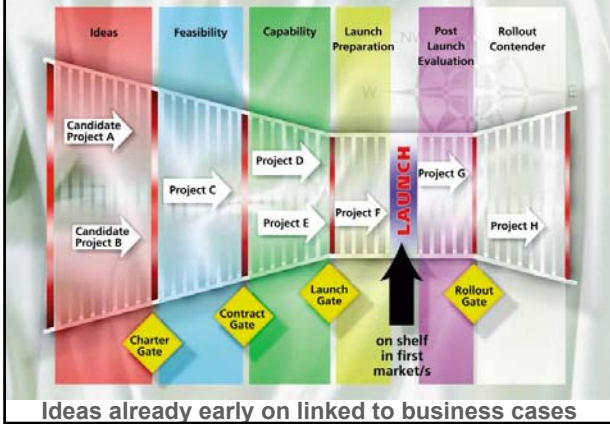
Operating Model



Key Parameters for Global R&D Project Characterisation & Prioritisation

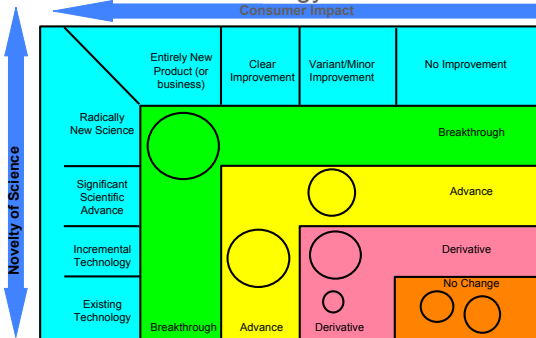


Funnel Approach for Global Innovation Projects



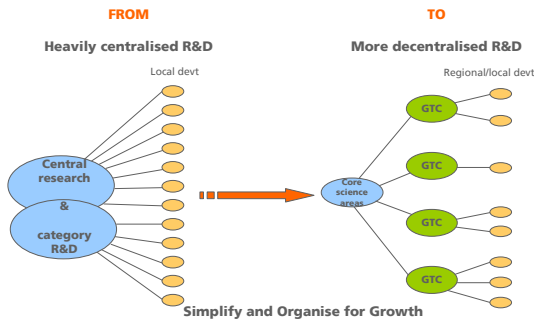
Each project is scored in terms of consumer impact & novelty of science/technology

Consumer Technology Matrix



Recent Changes

Unilever R&D



Unilever R&D

From

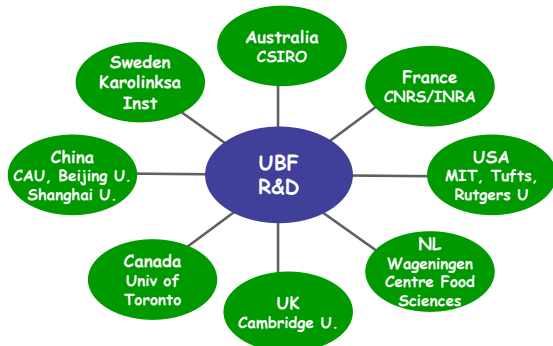
To

Budget driven
Knowledge
Centralised
Internal focus
Academic

Value Creation driven
Delivery in the markets
Closer to the markets
External focus
Consumer-need driven

and with better scale leveraging

UBF-R&D Linkage with External Top Institutes



Setting up of External Advisory Councils

e.g. Foods Research Advisory Council

Home and Personal Care

29 June 2004



Home & Personal Care R&D - Locations



Home & Personal Care R&D - Customers

LAUNDRY	HHC	ORAL	SKIN	DEO	HAIR

Home & Personal Care R&D - Skills

CORE SKILLS

- Product
- Process
- Packaging
- Safety/Health/Environment
- Evaluation

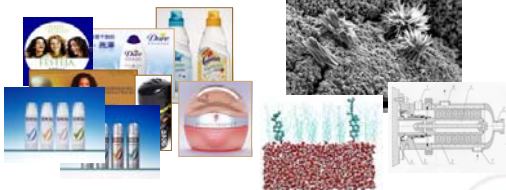


UNDERPINNING SCIENCE

- Physical Science
- Bioscience
- Process Science
- Consumer Science

R&D The Fundamental Balance

An organisational structure to achieve:



Focus on
the Customer

Scale and Depth
of the Science

Sources of R&D - The Philosophy

Practical solutions for the consumer's problems:

- Personal care
- Hygiene

As simple as possible



As leading edge as it needs to be



Sources of R&D - The Practice



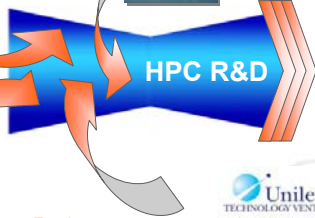
Academia



Suppliers



Corporate, Foods



AXE Deodorant

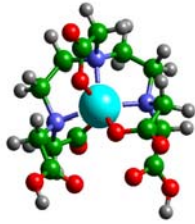
The Challenge:

- Helping young guys get the girl
- Smelling good — feeling good



Technical Approach

- Underarm odour is produced by bacteria degrading sweat
- Iron is essential for bacterial growth and is a waste product in human sweat
- By binding the iron, bacteria cannot grow

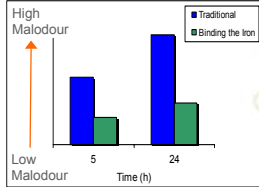


Iron bound by new Deo-active

Proving the Benefits



Benefits proven at 5 and 24 hours



- Unilever R&D deodorancy test - used for over 25 years
- Panels of 50 volunteers
- Expert odour assessors

How we communicate



Dove Shampoo and Conditioner

The Challenge:

- Softer, smoother hair
- You want to touch it
- You want it to be touched
- Stronger and resists damage better



Technical Approach

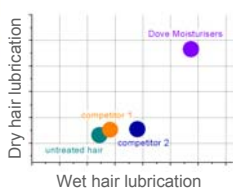
We understand hair fibres and their multi-scale structure



We did thousands of computer 'experiments'

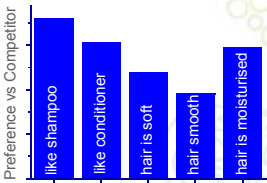
We used high throughput technology to identify new and effective lubricants

Proving the Benefits



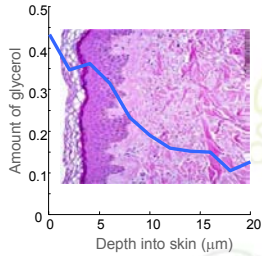
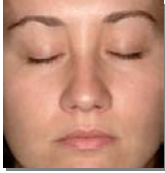
The result is less damage in combing wet and dry hair . . .

. . . and great consumer approval rating of the end product



Proving the Benefits

Laboratory tests proved that glycerol penetrates deep into the skin after 5 hours from application (Confocal Raman Spectroscopy)



Consumer tests proved noticeably firmer, smoother skin in 3 weeks

How we communicate



new Dove Firming.
As tested on real curves.



Home & Personal Care R&D - The Creative Scientific Edge



Touch
Appearance



Targeted Deposition
Measurement (Real life)
Microstructure (Nanotechnology)



Naturals
Genomics
Systems Biology
Surface Biosystems

Unilever R&D and Vitality

- Foods R&D -

Investor Relations Event

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Unilever R&D Vlaardingen,

The Netherlands



Contents

- Framework R&D within Unilever Foods
- Foods Research Centre & Unilever Health Institute
- Strategic Science Areas 
 - Nutrition & Health /
 - Consumer Perception & Behaviour
 - Flavour & Active Delivery Systems
 - Physics & Physical Chemistry of Food & Food Manufacturing

Framework R&D within Unilever Foods



↓
Science scouting

↓
Convert Foods & Nutrition Science to foods technology & novel nutritional claims

↓
Convert FoodsTechnology to designing& testing new product & production processes

Operates
Cross Category
Cross Brands
Vlaardingen (NL)
400 people

Linked to
Category/Brands





Foods Research Centre & Unilever Health Institute

- Delivers new technologies for breakthrough innovations
- Leads the world in strategic areas of food and nutrition science & technology

Strategic Science Areas

Nutrition & Health



Consumer Sensation, Perception & Behaviour

Flavour & Active delivery systems

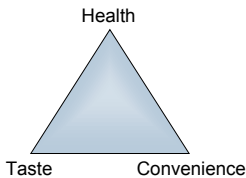
Physics and physical chemistry of foods and food manufacture

Why did we choose these areas?

- Critical for understanding (science) and delivering (technology) nutritional value, flavour and texture. These are essential quality attributes of foods in context of vitality
- Consumer perception & behaviour helps us to deeply understand consumer motivations, preferences and habit formation.

Consumer Demand

No Compromises



- ◆ 46% rarely or never give up **good taste** for Health benefits
- ◆ 25% rarely or never give up **convenience** for Health benefits



Exciting, Indulgent, **Healthy**, Convenient and **Trusted** Solutions,
Everytime and Everywhere

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Major Science & Technology developments relevant for Vitality in Foods

Advances in:

- Nutritional epidemiology
- Molecular and physiological effects of dietary components
- Interaction of genetics and diet (incl. genomics)
- Clinical testing of dietary effects **Nutrition science**
- Diagnostic methods
- Food science, processing, and ingredient technology (incl. nanotechnology)
- Consumer and sensory science
- Information science and technology

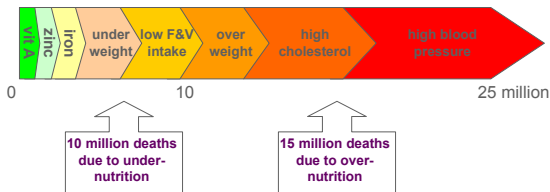
Nutrition has an impact on Vitality throughout life



Key Areas:

- Development and Growth
- Resistance to Disease
- Prevention of Chronic Degenerative Diseases (heart disease, etc.)
- Wellbeing & Appearance
- Performance
- Body Weight & Shape

Dramatic impact of sub-optimal nutrition on global health!



Data on 2000 from WHO (2002)

But how much do we actually know about the impact of nutrition?

Nutrition for and control of:	present knowledge status:
Physical Performance	
Bodyweight & Lean Body Mass	
Resistance to Disease (infectious)	
Development & Growth	
Digestive Health	
Bone & Joints Health	
Chronic Degenerative Diseases (heart disease, cancer, Alzheimer, diabetes)	
Skin & Hair quality	
Mood, Relaxation, & Sleep quality	
Mental Performance	

Nutrition & Health



Acknowledged by top experts and health organisations as leaders in nutrition and health.”



Achieved through

- First to identify and obtain health positive 'actives'
- Setting the scientific agenda & pace in healthy foods
- Build impeccable scientific credentials with top experts & health organisations
- Excellence in communicating nutrition and health benefits

Unilever Health Institute General Role

Established in 2000

Unilever's scientific centre of excellence on the relationship between diet, nutrition and health in various life stages and its face to the scientific world

Within Unilever it is the centre of knowledge on the consumer, the science, regulations, external experts and patents related to health and nutrition

UHI is part of a global Unilever network with access to the best external expertises and supporting the internal marketing/development functions

Three key areas of activities:

- new/improved health benefits of ingredients
- interfacing and communicating to health professionals, health organisations
- building a scientific reputation: publishing, conferences, presence in international organisations



UHI Focus Areas

Weight Management :

- Satiety enhancement
- Sustained energy delivery
- Muscle mass preservation
- Fat loss



Kids & Family Nutrition (incl. D&E) :

- Mental performance and cognitive development
- Growth & physical development
- Resistance to disease and improved gut health



Cardiovascular Health :

- Blood cholesterol lowering
- Blood homocysteine lowering
- Blood pressure lowering
- Improved blood circulation & improved vessel elasticity

Immune Health :

- Cell vitality enhancement
- Immune health optimisation



We manage our breakthroughs for these focus areas through a funnel approach from laboratory to clinical studies.



Nutrition Breakthroughs: Kids & Family Nutrition (D&E)

Active(s)	Target Benefit	Evidence "Proof of Principle"	
		Laboratory	Clinical
Specific Immuno Proteins	Gut Health	Done	'05
(Black) Tea	Gut Health	Done	'04
Specific Carrot Extracts	Gut Health	Done	'04
Specific Iron Salts	Bioavailability	Done	'04
Minerals Vitamins Good Oils	Improved Cognitive Performance in Kids	N.A.	'05





Consumer Sensation, Perception & Behaviour

"Building a world class capability in behavioural sciences to proactively anticipate preferences"

Achieved through

- First to develop an understanding of human sensation, perception & behaviour
- Develop models and approaches to identify future consumer needs / hotspots
- Build an ability to predict benefits consumers will perceive, believe, buy and re-try



'Flavour and active' delivery systems



"Design superior sensory and functional ingredient delivery systems to surprise and delight the consumer."

Achieved through

- First to predict and control delivery of compounds in the mouth/nose and in the human digestive tract
- First to develop an overall understanding of receptor biology and food ingredient/bio-surface binding

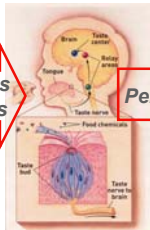


Linking molecules to liking: Flavour Delivery

Food:
Molecules and structures (taste, smell, mouthfeel, vision, etc.)



Various senses

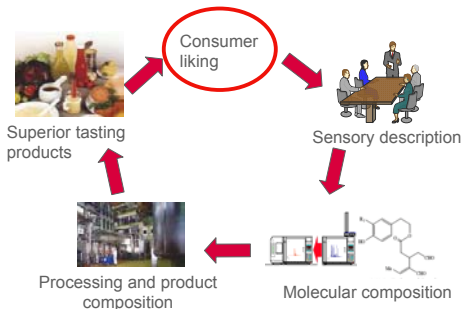


Perception



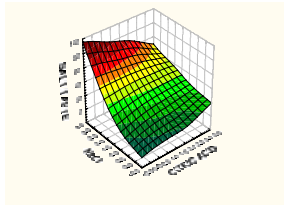
CASCADE Binding of chemicals to receptors in taste cells bonded in a taste bud triggers a series of reactions that culminate in signals to a taste center in the brain.

Unilever flavour capabilities Translate liking into product composition



Unilever flavour capabilities

Modulation of salt perception



Example: Salt perception is also under control of ingredients other than salt, e.g. citric acid

Physics and Physical Chemistry of Food and Food Manufacturing

“Build world class capabilities in physical science in order to design and construct superior products.”

Achieved through

- Setting the scientific agenda in food physics
- Set the pace in development of advanced physical and molecular models for foods
- To design and build novel structures to meet current and future consumer needs



Food Structure

Basic Building Blocks

Proteins



+
Minor Ingredients
+
Processing



Ice-Cream
Soups
Drinks
Dressings
Spreads
Mayonnaise



Carbohydrates



Fats

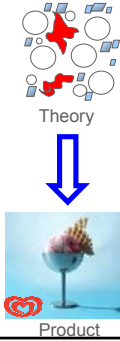


Complex Structure:

- Gives Sensory Experience
- Gives Appearance/Texture
- Dictates Storage Stability
- Provides in-use Performance


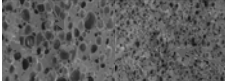

Unilever Food Structuring and Processing Capabilities

- In depth understanding of structuring properties of food ingredients
- State of the Art high measurement facilities:
 - electron microscopy (very high resolution $10^{-9}m$)
- Molecular modelling
- Emulsion and Crystallisation expertise
- Engineering expertise:
 - in-house design and implementation at factory scale



Cold Extrusion Technology

Classical Ice-Cream	Cold-Ex Ice-Cream
Made at -5C, then hardened	Extruded at -25-30C: not hardened
Large Ice crystals/Air Cells	Smaller Ice Crystals/Air Cells
Less creamy	More Creamy
Uses more fat	Uses less fat

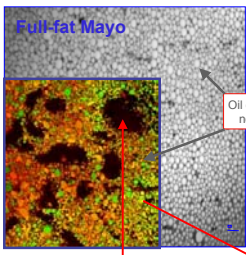




Advantages

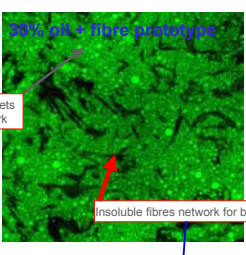
- Eliminate hardening
- Lower cost processing
- Lower fat products
- Raw materials savings

Natural Structuring Technology

Full-fat Mayo

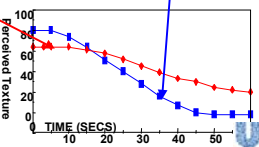


30% oil + fibres prototype



Advantages

- Better taste & creamier texture
- Lower cost processing
- Variable texture (smooth to pulpy)



TIME (SECS)	Perceived Texture (Red Triangles)	Perceived Texture (Blue Squares)
0	100	100
10	90	85
20	80	70
30	70	55
40	60	40
50	50	30

Unilever R&D and Vitality

- Corporate Research -

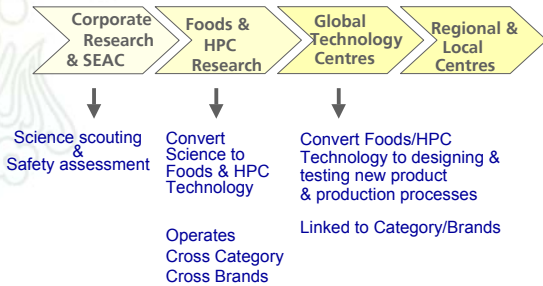
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Organisational Framework R&D



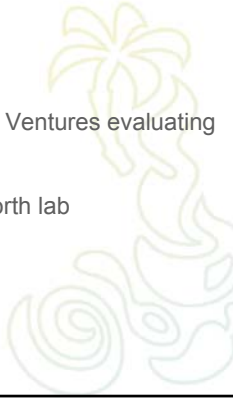
Corporate Research

Purpose

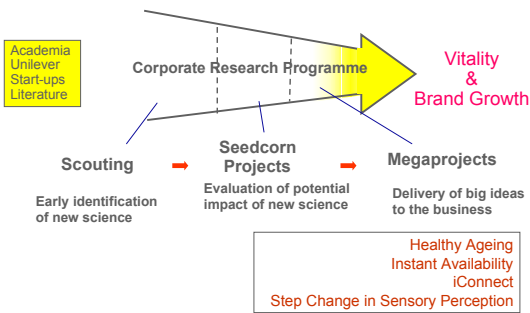
- Scout for developments in science new to Unilever
- Translate these into capabilities for Unilever
- A 10-year horizon
- Four areas of science with possible major impacts
- Genomics
- Informatics
- Nanotechnology
- Neuroscience

Corporate Research

- 25% external spent
- Through Unilever Technology Ventures evaluating start-up companies
- Consolidated in our UK Colworth lab



The CR Funnel



Step Change in Sensory Perception

Sensory Perception is a "holistic experience"

- taste
- smell
- colour
- sound
- texture



Eat / Drink



Taste bud in the tongue
Detect



Perceive



React

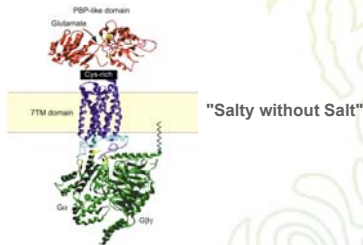
Input → Integration → Behaviour

Key Objective of Programme

Develop technology to deliver products with great salt taste but without associated health implications

Corporate Research

Example Step Change in Sensory Perception



Taste Receptor technology

Conclusions

- Our model ensures a unique connection from fundamental science to new product delivery
- Our model enables us to pick up and evaluate new science areas quickly
- All our R&D effort is focused, early on through projects, on brands and consumer needs
- We have strong underlying science capabilities for nutrition, hygiene and personal care innovations
- Both divisions share common science bases such as product structuring, consumer science and active delivery
- R&D is ready for the new Vitality Mission of Unilever

Thank you