

The Food, GI-tract Functionality and Human Health Cluster

PROEUHEALTH





A scientific approach to develop probiotics for human health

All of us carry in our intestinal tracts a complex ecosystem of microbes. These bacteria are highly important to our health, providing us with protection against intestinal infections, supplying us with additional nutritional value from the food we eat, and contributing to the development of our immune system. The flip-side is that disturbances in this ecosystem can leave us more vulnerable to exogenous and endogenous intestinal infections. Intestinal bacteria have also been implicated in some chronic and degenerative diseases of the gut.

Understanding the relationships between food, the intestinal microbiota, and health and disease will enable scientists to develop foods and therapies that can maintain or improve our health.

The Food, GI-tract Functionality and Human Health Cluster PROEUHEALTH brings together 64 research partners from 16 European countries in the quest to obtain greater knowledge of the role of the intestinal microbiota in human health and disease and to develop new functional foods and therapies. The research will run for 4 years starting February 2001 and is subsidised by the European Commission's 5th Framework Programme, Quality of Life and Management of Living Resources Key Action 1, "Food, Nutrition and Health".

The cluster aims to provide:

- A clearer understanding of the relationships between food, intestinal bacteria and human health and disease.
- New molecular research tools for studying the composition and activity of the intestinal microbiota.
- New therapeutic and prophylactic treatments for intestinal infections, chronic intestinal diseases, and for healthy ageing.
- A molecular understanding of the underlying mechanisms of the inhibition of pathogenic bacteria.
- A molecular understanding of immune modulation by probiotic bacteria and examination of probiotics as vaccine delivery vehicles.
- Process formulation technologies for enhanced probiotic stability and functionality
- Biosafety evaluation of probiotics used for human consumption.
- Commercial opportunities for food and pharmaceutical industries.

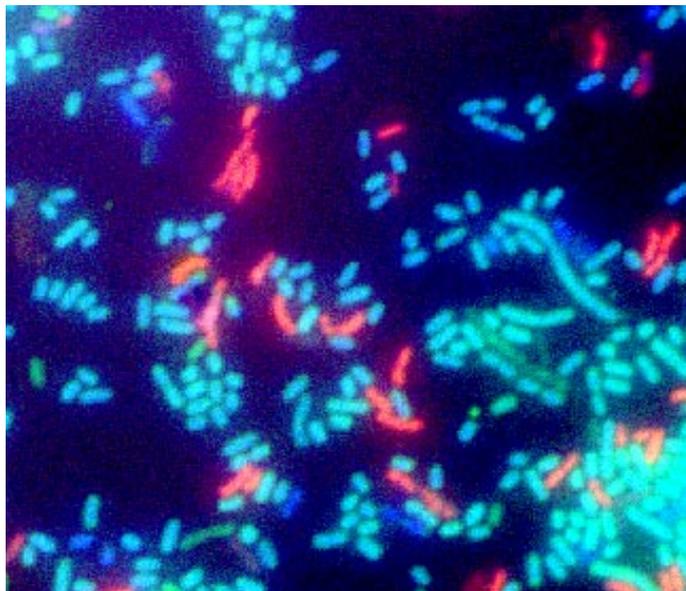
The cluster projects

Eight complementary multicentre European projects are included in the cluster. They cover all aspects in the development of new probiotic foods, from designing molecular tools to study the ecology of the intestinal microbiota, to understanding mechanisms of bacterium-host interactions, providing solutions to food technology issues, and conducting human clinical trials to assess efficacy in preventing or treating disease.



Development and application of high throughput molecular methods for studying the human gut microbiota in relation to diet and health

Microbe Diagnostics, QLK1-2000-00108



Advanced automated molecular methods for monitoring responses of human gut microbiota composition and gene expression are essential tools for studying the intestinal microbiota. In this project, such methods will be developed and applied to identifying links between intestinal dysfunctions and intestinal bacteria, and to providing a greater understanding of mechanisms underlying the relationships between diet, life style, intestinal bacteria and optimal health.

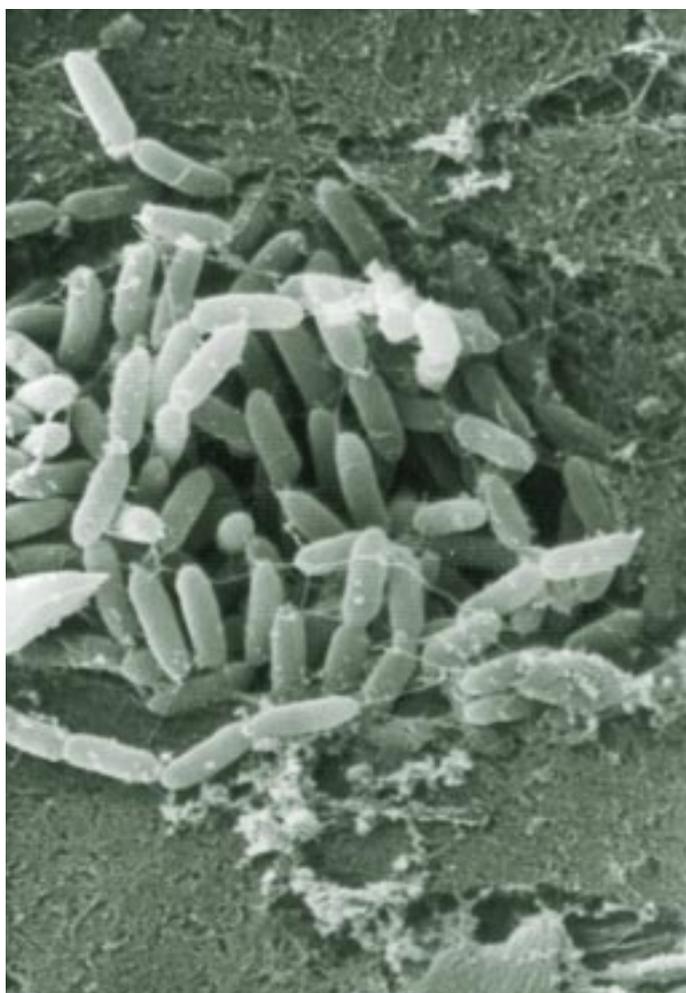
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Probiotic strains with designed health properties

Deprohealth, QLK1-2000-00146



The molecular mechanisms affecting immunomodulation by probiotic lactobacilli will be examined using specifically designed bacterial strains. This will provide a better understanding of the molecular factors affecting immunomodulation and immunogenicity, enabling the selection of probiotic strains with enhanced protective or therapeutic effects. This knowledge will also be used to design and assess new probiotics as vaccine delivery vehicles.

Two types of intestinal diseases will be targeted in this project:

1. Inflammations such as inflammatory bowel disease (IBD)
2. Infections such as those caused by rotavirus and *Helicobacter pylori*

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Probiotics and gastrointestinal disorders – controlled trials of European Union patients

Progid, QLK1-2000-00563



Inflammatory bowel diseases (IBD) such as Crohn's disease and ulcerative colitis are immune-mediated diseases of unknown aetiology that result in chronic relapsing inflammation of the gut. This project will assess the efficacy of two specially selected probiotics in alleviating the effects of IBD in long-term human clinical trials, and will explore the role of the human intestinal microbiota in these diseases.

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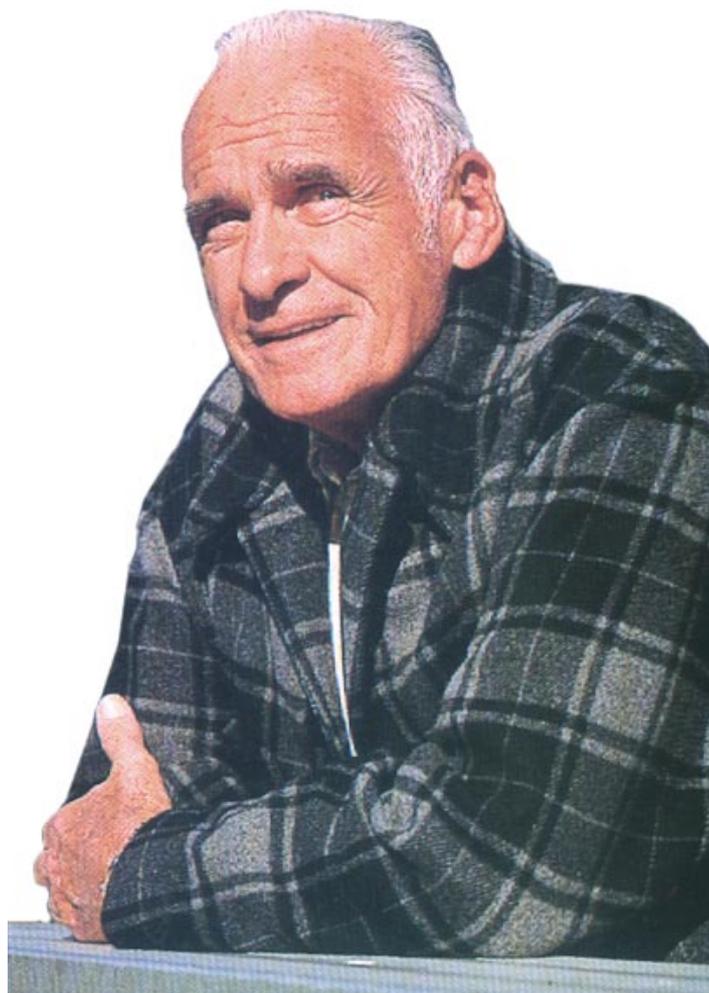
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Functional foods, gut microflora and healthy ageing

Crownalife, QLK1-2000-00067



The effect of ageing on the composition and activity of the intestinal microbiota will be investigated in order to develop strategies to protect against degenerative intestinal diseases and reduce susceptibility to infection in the elderly. New functional food ingredients will be developed that positively affect the intestinal microbiota. These ingredients will be trialed in elderly populations to examine effects on biomarkers of health and disease.

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Nutritional enhancement of probiotics and prebiotics: technology aspects on microbial viability, stability, functionality and on prebiotic function

Protech, QLK1-2000-00042



Maintaining the viability, stability, and functionality of probiotics during processing, formulation and storage is essential to delivering the health benefits of these ingredients to consumers. In this project, the effects of processing on probiotics will be explored and used to develop optimal process and formulation technologies to maintain the stability and functionality of probiotics. New processing techniques will be applied to the development of functionally enhanced prebiotics and synbiotic combinations.

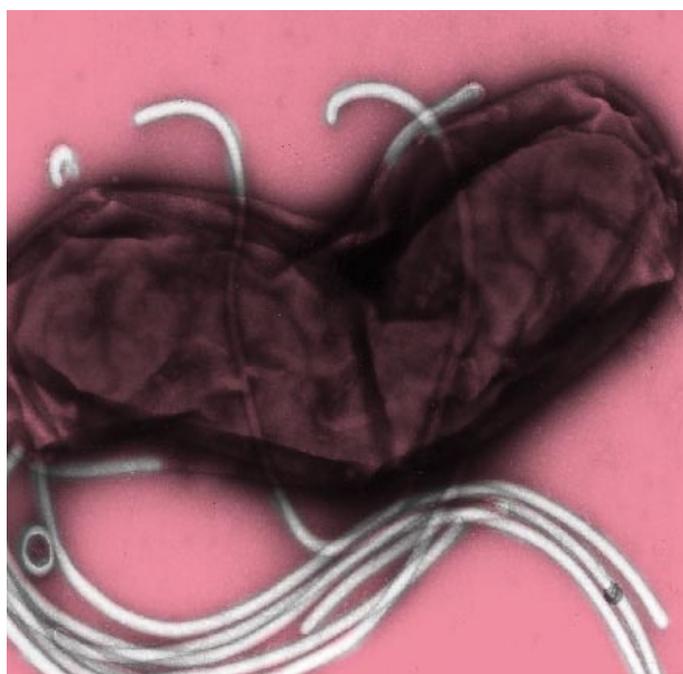
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Molecular analysis and mechanistic elucidation of the functionality of probiotics and prebiotics in the inhibition of pathogenic microorganisms to combat gastrointestinal disorders and to improve human health

Propath, QLK1-2001-01179



The effect of probiotics on the inhibition of Gram-negative pathogenic bacteria - like the enterovirulent diarrheagenic *Salmonellae*, and *Helicobacter pylori* causing gastrointestinal disorders – will be studied. This project will focus on the identification of the responsible compounds, and the mechanism of the inhibition of Gram-negative pathogens by probiotic lactobacilli and bifidobacteria. This will be studied using coculture models (simulated gut fermentations, human cell lines and animal models) and clinical experiments.

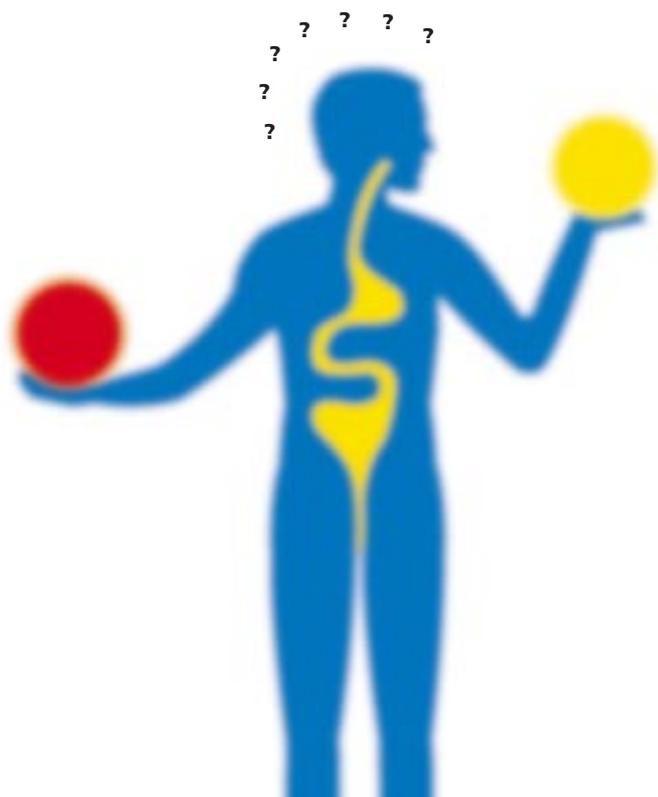
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Biosafety evaluation of probiotic lactic acid bacteria used for human consumption

Prosafe, QLK1-2001-01273



The biosafety of probiotic bacteria (e.g. lactobacilli, lactococci, enterococci, and bifidobacteria) will be assessed. The objectives will cover taxonomic description, detection of resistance genes and virulence properties, immunological adverse effects as well as survival, colonisation and genetic stability of probiotics in the human gut. The project will result in recommendations for biosafe and biosafety testing of probiotics.

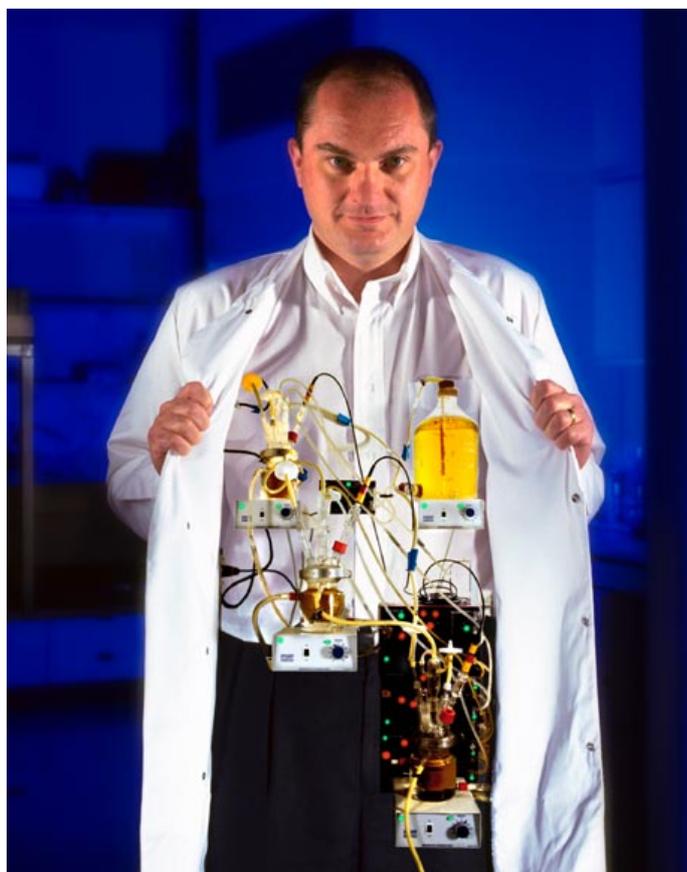
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Functional assessment of interactions between the human gut microbiota and the host

EU and microfunction, QLK1-2001-00135



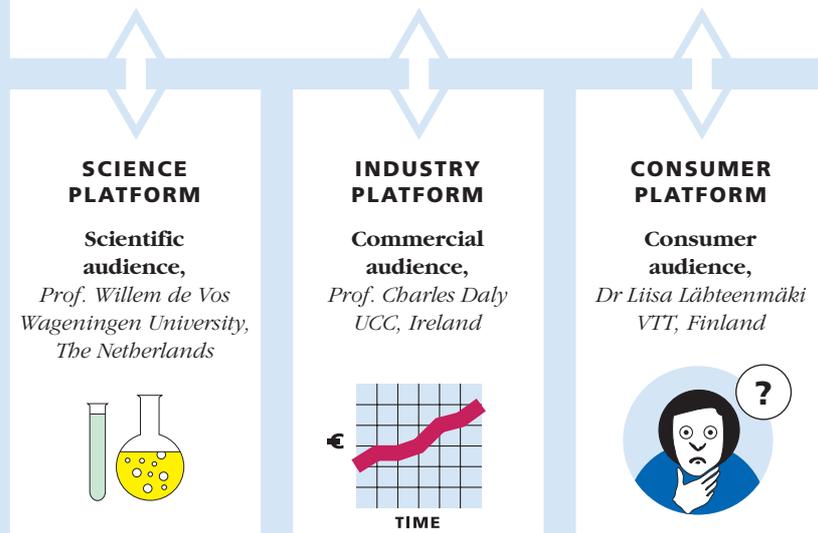
There is an imperative requirement to identify the realistic health outcomes associated with probiotic and prebiotic intake and give rigorous attention towards determining their mechanisms of effect. The project focuses on the effects of live probiotics, dietary carbohydrates known to have a selective bacterial metabolism (prebiotics), and a combination of these two (synbiotics) on the human gut microflora and gastrointestinal function. Special attention will be invested on the mechanisms involved in the functionality through novel model systems and newly developed molecular-based techniques.

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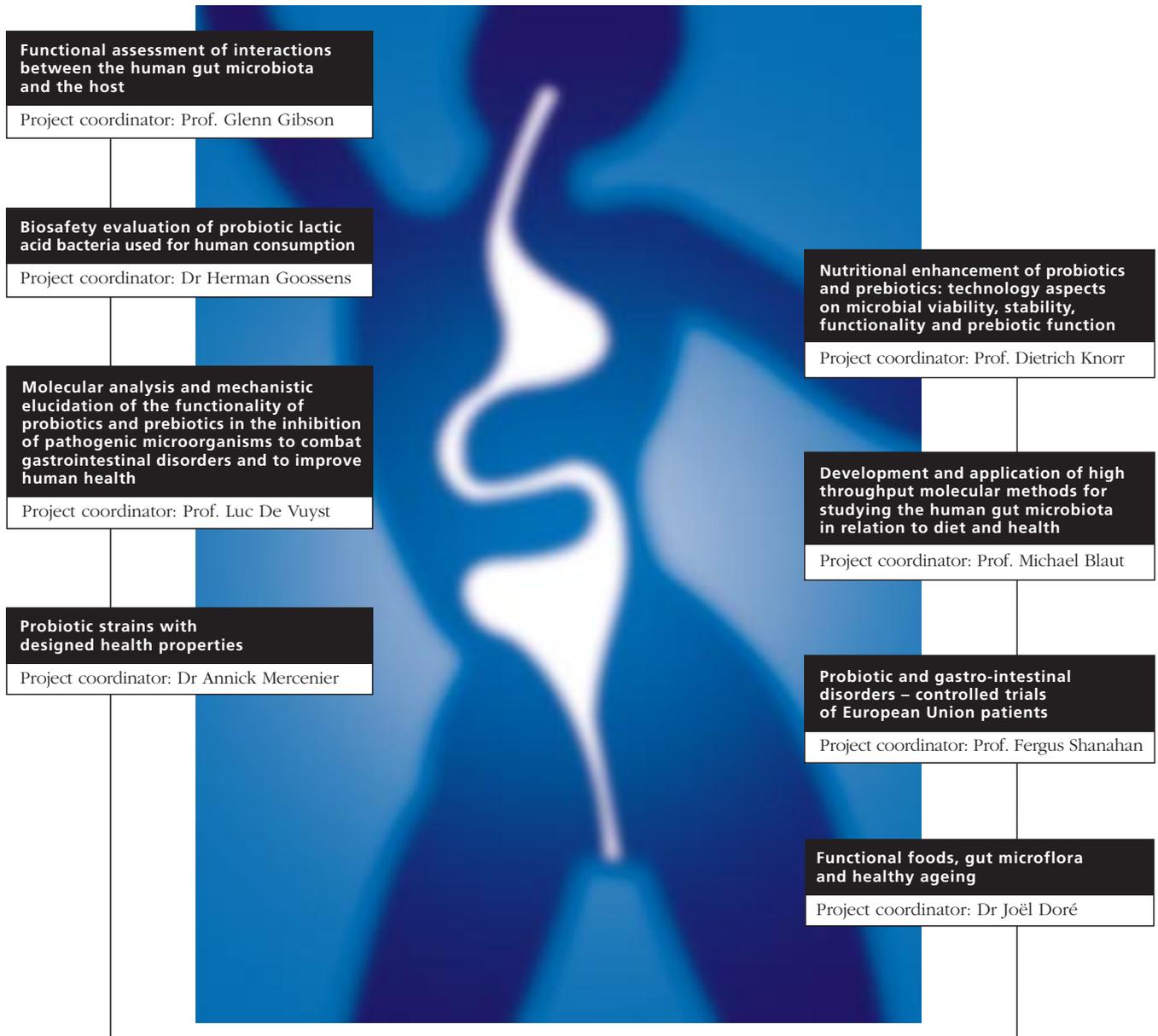
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Dissemination of cluster activities



Three platforms will disseminate the aims and findings of the cluster to targeted audiences.



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