Building on this idea, the RECAPT project (running from 2011 to 2014) aims to strengthen collaboration around the management of innovations along the food supply chain, such that research findings can be effectively integrated into the development of innovative and sustainable products that meet consumer acceptance.

The core element of the RECAPT project is the Collaborative Food Innovation Forum (CFIF), a unique platform that brings together food scientists, the food industry, caterers and retailers. It allows the different actors to exchange information, facilitates trust building and promotes effective cooperation among all actors. The CFIF discusses issues related to promising novel food technologies, consumer acceptance of new products based on novel technologies, retailer and caterer adoption of new products as well as innovation management processes in the food chain.

Through this exchange, RECAPT will contribute to a higher degree of innovativeness across the food supply chain, thus contributing to the global competitiveness of the European food sector.

Promising novel food technologies
RECAPT has identified 15 novel food technologies (Table 1), which have either not yet been implemented in the food industry or that are implemented but have the potential for improved and/or extended application. Most importantly, we consider these technologies to have the potential to provide significant benefits for consumers, retailers and/or caterers. The 15 technologies can be divided into four categories: texturising methods, mild processing, electromagnetic methods and advanced packaging methods.

All technology candidates were evaluated regarding their contribution to processing, preserving and decontaminating food products\(^1\). Criteria included the status quo of the implementation level, benefits and shortcomings for consumers (e.g. ‘fresh products’, ‘no additives’, ‘enhanced taste’) but also for retailers and caterers (e.g. price margins, increased shelf life, extension of assortment or added value), and issues related to the adoption of such technologies (e.g. number / range of products a technology can be applied on, costs per treatment, expected market share and possible restrictions).

During the first CFIF workshop held in conjunction with SIAL 2012 in Paris, these novel technologies were introduced to an audience of food retailers and caterers. Each technology was discussed in detail, with regards to development status, level of current acceptance and indicators for future acceptance or reluctance by consumers.

Consumer acceptance of new technologies and products
In addition to selecting promising novel technologies, RECAPT focuses on the analysis of factors that determine consumer acceptance of such new technological processes. The three main areas cover acceptance of specific food and drink products to which such technology has been applied, the role that retail and catering play therein, and what strategic options emerge from this on the impact of the retail sector on (selective) adoption of food and drink innovations.

The work proceeded in three different steps. The first step was to identify emerging consumer wants and needs of relevance for technology acceptance\(^2\). Five emerging trends were identified that are particularly relevant to food technology development and acceptance.

### Table 1: Overview of promising novel technologies

<table>
<thead>
<tr>
<th>Texturising methods</th>
<th>Mild processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrodynamic pressure technology</td>
<td>High pressure processing (HPP)</td>
</tr>
<tr>
<td>(shock wave)</td>
<td>Infrared heating</td>
</tr>
<tr>
<td>Ultrasonic cutting</td>
<td>Super critical fluid extraction (SCFX)</td>
</tr>
<tr>
<td>High pressure homogenisation</td>
<td>Advanced packaging methods</td>
</tr>
<tr>
<td>Electromagnetic methods</td>
<td>Intelligent packaging</td>
</tr>
<tr>
<td>Pulsed electric fields (PEF)</td>
<td>Radio Frequency Identification (RFID)</td>
</tr>
<tr>
<td>Electron beam irradiation</td>
<td>Edible coatings</td>
</tr>
<tr>
<td>Chronic heating</td>
<td>Active packaging</td>
</tr>
<tr>
<td>Cold plasma</td>
<td>Biodegradable packaging film</td>
</tr>
</tbody>
</table>
These are: health, convenience, pleasure, sustainability and authenticity. For each of these trends, it was analysed ‘what the trend will mean for actors in the food chain’.

Importantly, the report identified that these ‘new trends’ do not replace established food choice motivation such as ‘good taste at a reasonable price’, but rather they just add to the requirements of the demanding consumer that ‘wants it all’. Next to this more holistic trend of ‘want it all’, a second holistic trend of ‘relationship building’ was identified, which acknowledged that technology plays an important relationship building role in terms of interactions with the consumer about products and services. During the discussions with the CFIF-Amsterdam meeting, a first outline of the guiding model was developed.

In a second step, the scientific literature on consumer acceptance of new food technologies was reviewed, and organised around the RECAPT model of Food Technology Acceptance. The model identifies three paths through which technology attributes can influence end-user choice. The first path is the tangible product attributes modified by a technology, resulting in changes in the product quality as perceived by the end user. An example would be tenderising technologies that improve meat texture. The second path involves technology features that impact on retail and catering service attributes (an example would be mild processing technologies that increase shelf life, or allow uncooled presentation of products without impacting on taste). The third path involves associations with the technology in itself, resulting in socio-political technology attitudes that can create resistance against, or support in favour of the new technology as a whole. The model states that end-consumer acceptance of products produced with new technologies can be only be understood if all three routes (the consumer benefit road, the retail / caterer service road, and the technology attitudes road) are considered together and in interaction.

The model was then applied to four sets of technologies (mild processing technologies, electromagnetic methods, texturing methods, and novel packaging and storage technologies) for which the scientific literature on consumer acceptance was reviewed, and organised around the product attributes, socio-political attributes and retail / catering value. The amount of consumer evidence differs considerably between the technologies, confirming that they are at different stages in their life cycle; or that the relation to end-users considerably between the technologies, confirming that they are at different stages in their life cycle; or that the relation to end-users received different levels of attention.

Overall, the report finds support in the literature for the proposed model, but concludes that the three routes toward end-user acceptance have largely gone un-integrated in the existing literature. Future scientific research should focus more on the integration of and integration between the three routes of how technology features may affect end consumer acceptance.

This conclusion of course also holds for the more practical implications of the model and from it a checklist was derived allowing a novel product to be checked against the general knowledge in the field related to each of the three paths. The checklist focuses on the following three questions:

1. Does the technology change (experience or credence) product attributes?
2. Has the technology the potential to create strong socio-political technology attitudes?
3. Does the technology change the way products are presented/delivered to the consumer in retail or catering?

In a third step, strategic options for CFIF were extracted for selected streams of food technologies identified in RECAPT’s work package 3. This was achieved by mapping on the RECAPT model the available scientific information on the four groups of technologies identified in WP3 as promising (electromagnetic methods, texturing methods, mild processing, and advanced packaging methods). These were further discussed in detail with the stakeholders present at the CFIF-meeting in Paris (October 2012). Together, this information has formed the basis for the formulation of strategic options for each of the technologies.

Although all four groups of technologies were perceived promising, the consensus was that advanced packaging methods and mild processing technologies are expected to show the greatest potential in terms of consumer acceptance. The overall conclusion was that for this potential to be realised in the market place, scientists and practitioners have to communicate any new technology and products based on that technology in a friendly and easy to understand way, to ensure that consumers can make an informed choice.

Where do we go from here?

In RECAPT, we are now exploring the decision-making processes of retailers and caterers for new products and technologies and conducting an investigation of current innovation models in the food industry, particularly those focusing on open and collaborative innovation.

To learn more about the RECAPT project, visit the project website (www.recapt.org) or contact Dr Lars Esbjerg (lae@asb.dk), who is the Executive Project Director of RECAPT.

This project is supported by the European Commission under the Food, Agriculture and Fisheries, and Biotechnology theme of the 7th Framework Programme for Research and Technological Development.

**CFIF Workshop**

The next CFIF workshop will be held on 3 April 2014, at the Hotel Plaza Cataluña in Barcelona, Spain. Register now to join the discussion on how you can benefit from and organise collaborative innovation with suppliers or customers! Places are limited and travel expenses will be reimbursed. Contact Viviane Glanz (Glanz@asb.dk).

**References**

4. Tudoran, AA, L Esbjerg, AMH Fischer, HCM van Trijp & KG Grunert (2013), Identifying Strategic Options for Food Innovation. RECAPT deliverable D2.3.