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The international packaging research and education newsletter

Advising EU on Circular Economy

European packaging-chain association Europen and 28 other organisations, including Incpen in the UK, have put forward a set of recommendations ahead of the European Commission's Circular Economy proposals, expected by the end of the year.

Virginia Janssens

Europen MD Virginia Janssens, who was a keynote speaker at IAPRI's 2013 Symposium in Finland, tells IAPRI: "The Packaging and Packaging Waste Directive (PPWD) is – and should remain – the reference EU directive for the packaging supply chain. It is fundamental for guaranteeing the free movement of packaging and packaged goods in the EU internal market."

She adds: "The PPWD has dual objectives: environmental protection and functioning of the internal market. It also enshrines a holistic approach in that it integrates both product and waste measures."

Janssens concedes: "Some regulatory gaps will need to be addressed in the upcoming EU waste legislative proposal, as part of the Circular Economy Package (CEP)."

These gaps, according to Europen, include the need for a "clear and harmonised methodology" for measuring and reporting national packaging recycling rates, and the need to strengthen the current approach to extended producer responsibility (EPR).

Incpen director Jane Bickerstaffe says: "The existing PPWD is very much focused on end-of-life. We hope the CEP will appreciate that packaging's role in the supply chain is more important than what happens to it after use."

www.europen-packaging.eu
www.incpen.org

Working Groups tackle major themes

The June Symposium in Valencia has energised IAPRI's Working Groups (WGs), with the Packaging and the Consumer WG and Sustainable Packaging WG being especially active.

Packaging and the Consumer has already co-ordinated one piece of international research on attitudes to packaging, and is collecting further data with a view to presenting its findings at next year's IAPRI Conference in Campinas, Brazil (12-15 June 2016).

With Carlos Diaz of Rochester Institute of Technology and Tamal Ghosh of PepsiCo as the co-chairs, Sustainable Packaging has continued a LinkedIn discussion around areas including biodegradability. During the June WG meeting in Valencia, Ghosh moderated a debate exploring the relevance of biodegradability to packaging, costs versus benefits and the fact that it is not a solution for littering.

http://iapriweb.org/membership/working-groups/

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Meeting industry

Given all the exciting and painstaking research worked on by so many IAPRI members, many of you have asked me about ways of improving outside access to that research. In particular, how can we give industry better access, with a view to finding commercial applications?

Interested parties could include packaging converters and logistics businesses, but also the consumer goods companies which ultimately benefit from packaging and supply-chain innovation. Of course, many organisations of these types demonstrate their commitment to research by becoming IAPRI corporate members.

The Board has discussed ideas for a 'Research Meets Industry' poster session, perhaps in parallel with the established posters sessions that are already such a successful feature of our events. We would love to be able to organise the first of these industry-access sessions during next year's IAPRI Conference in Campinas, Brazil (12-15 June 2016).

We would probably aim to keep these industry-facing poster presentations fairly general, not pitched at a particularly high or technical level, as open-ended as possible in terms of applications, and with the focus on the routes to industrial production scale.

In order to do this, we would like to hear from you. Does the concept itself make sense? And if so, how should we go about making it a success? Who should we invite, and how can we incentivise them to visit?

Please drop me a line at **thomas.goedecke@bam.de** if you have any thoughts on the topic.

Thomas Goedecke
IAPRI President

New MSU director recruits

Michigan State University's (MSU's) new director of the School of Packaging Susan Selke has begun a search for new faculty members and said that more will be required over the next 18 months.

Selke, who took up the post earlier this summer, was previously acting director from 2007 to 2009 and most recently served as associate director. As well as being a professor in the School of Packaging, she is adjunct professor of chemical engineering at MSU's College of Engineering.

She was recognised as an MSU distinguished faculty member in 2012.

'Dr Selke is the right person to lead the School of Packaging at this time'

Speaking at the time of her appointment, Selke said: "I'm humbled and honoured by the opportunity to lead the School of Packaging during this time of refocusing

Susan Selke

and reinvention as we transition into the future, ensuring that MSU continues to be the home of the foremost packaging education programme in the United States and the world."

Dean of the College of Agriculture and Natural Resources Fred Poston said: "The School of Packaging has long been a pioneer in the field of packaging and Dr Selke is the right person to lead it at this time."

Currently the School of Packaging is carrying out searches for two faculty places, and has plans to fill a further two faculty positions over the next year and a half, she says.
www.packaging.msu.edu
https://jobs.msu.edu

PLA separation and recycling

Germany's Fraunhofer IVV is half-way through a two-year research project to develop ways of separating out 'pure' polylactide (PLA) from post-consumer waste.

As IVV points out, PLA remains the most important biobased plastic used in packaging. But up to now, it has not been collected in large quantities nor recycled. One of the challenges is that the biopolymer is often used as part of a laminate or a blend, making the recovery of high-quality PLA using conventional recycling methods extremely difficult.

Currently, Germany's Federal Ministry of Food and Agriculture (BMEL) is funding research at IVV into solvent-based recycling. This, according to Fraunhofer, has been shown to be a successful technique for separating out conventional thermoplastics such as polyethylene terephthalate (PET) and polystyrene.

The objective is to compare the outputs from solvent-based recycling and conventional/mechanical recycling (using recompounding), while also focusing on economic viability.

The institute talks about "intense ongoing collaboration" with the Fachagentur Nachwachsende Rohstoffe (FNR – Agency for Renewable Resources) research alliance, with a further four projects already underway in this area of sustainable recycling for biobased plastics. The FNR is supported by the BMEL.
http://www.ivv.fraunhofer.de

Transit test research collaboration

IAPRI corporate members PepsiCo and Lansmont are among the lead advocates in a new research programme launched by the International Safe Transit Association (ISTA), with Smithers Pira joining as a partner, and institutes including Michigan State University, Clemson University, CalPoly and Incpen in the UK endorsing the initiative.

The five project proposals currently prioritised under the Advocate Research and Value Delivery Program and being scoped by ISTA staff are:

- a review of global transit damage scenarios, with a view to improving or introducing new test procedures;
- the development of a test protocol for e-commerce channels;
- the collection of first-time and updated distribution environment data to help optimise test levels;
- the development of a test technique to determine if – and by how much – a pack design is above the threshold performance required by its supply chain;
- the collection of data and design of tools which will help to improve the predictability of load stability.

As of 22 September, 17 advocates had signed up for the programme, with $1.225M of the $2M funding target for 2015 already pledged.

Ed Church

Says ISTA president Ed Church: "The good news is that it's not too late to be a part of this process. Multi-year pledges made in 2015 with payments starting as late as 2016 are being accepted."

Church, who is retiring as president of ISTA at the end of the year, adds: "We want to encourage more participation both in these first projects and in suggestions for further projects to undertake in the near future."

The ISTA-led programme began with a data gap analysis process and member feedback on transit damage. The operating principles for a research consortium and a three-stage gate process for assessing potential projects were established.

"For the past few years at the ISTA, we've been working mostly on general simulation tests," Church explains. "Achieving a higher level of testing means knowing more about specific channels of distribution. At the same time, sustainability issues have been emerging more strongly."

On this topic of 'right-weighting', Church says: "This requires test performance levels which are spot-on. Too low, and there is excessive damage to the product. Too high, and it means that every package is over-designed."

Work on the programme will last for at least the next five years, but no time limit is being set on individual projects, says ISTA.

At Smithers Pira in the UK, distribution and product testing operations director Sam Sheppard Fidler says: "This programme is addressing the issue that so many organisations carry out small packets of research. But what ISTA is trying to do is take stock and initiate a much bigger collaborative process."

At a later stage, research providers will be invited to tender bids for those projects which gain final approval.
www.ista.org

Belgian partners in biobased project

Belgian IAPRI members Celabor and Pack4Food are among a consortium of nine research organisations participating in the ACTIPOLY European CORNET project which aims to produce a combination of bio-derived packaging and natural antimicrobials to extend shelf-life.

The project began earlier this year, and will last two years in all.

The objective is to produce a thermoformable paper-based tray coated with biobased polymers to provide gas and water barrier. Lidding will be made of biobased plastics. Natural antimicrobials will be integrated into the packaging, which will be tested for effectiveness in real supply chain conditions, using fresh meat under modified atmosphere (MAP).

The entire pack will be designed to be compostable.

According to Celabor, nearly 2 billion tonnes of fresh food packaged under modified atmosphere were consumed in Europe during 2013. But it also points out that around 40% of finished fresh products are not consumed. When this occurs in the supply chain, this means that food is being thrown away still in its packaging. This in turn demonstrates that conventional MAP is not always sufficient to guarantee the preservation of food, says the consortium.

www.celabor.be
www.pack4food.ugent.be/

From eye-tracking to why-tracking

The future of 'eye-tracking' is likely to take consumers into the world of immersive virtual reality, but it could also go well beyond what eye movements alone can tell us

Whether you are interested in the marketing and sales impact of packaging or how effectively information is presented, eye-tracking is a valuable and fast-evolving tool. That value could increase still further if – or more probably, when – it is integrated with other techniques for assessing consumers' unconscious responses.

Tobii Glasses used in a real shopping environment

At Clemson University's CUshop and Package InSight, an executive member at the on-campus Sonoco Institute, Andrew Hurley and his colleagues last year completed 165 eye-tracking studies, split roughly half-and-half between suppliers and brand-owners.

"We do a lot of work on structure and substrate," he says. "Graphic design is typically tested if multiple firms are engaged or designs are being considered for a launch."

Much of this work involves comparing competing brands in the same category. "Many products aimed to increase package attention at the point-of-sale (POS) do not actually influence perception, or worse, could be a hindrance to sales over the control sample tested."

At last summer's IAPRI Symposium in Valencia, he presented a paper looking at the effects of foil stamping on consumer attention.

One example of supplier-driven work was an eye-tracking study on different label substrates for craft beers carried out on behalf of Avery Dennison. Craft beer is one of the fastest-growing, most fragmented and competitive categories in the USA. During the two-day study, 193 consumers viewed around 100 different bottles, some with metallised labels, some with matte film, white gloss film, wood veneer or paper.

'Eye-tracking is a great way of understanding what people do, rather than what they say they do'

Metrics such as total fixation duration and time to first fixation were measured. These quantitative results were then compared with the outcomes of a qualitative questionnaire. Interestingly (but not uncommonly with eye-tracking), there was a mismatch between the labels consumers said they preferred (the wood-finish label) and the labels they actually looked at the most (metallised and clear).

London company Lumen Research uses eye-tracking to assess marketing and advertising material as well as packaging. MD Mike Follett says: "Eye-tracking is a great way of understanding what people do, rather than what they say they do. Most market research revolves around people being asked questions about what they think about a pack design or concept. But sometimes designs work best when people don't engage their rational brains at all."

Also at the Valencia Symposium, Manuel Contero of the School of Industrial Engineering at Valencia's own Polytechnic University gave a paper on an eye-tracking theme, but this time exploring the correlation between real and artificial stimulus.

According to Contero, his was not the first research to highlight the different gaze patterns associated with otherwise similar real and artificial representations. "But the context of the work presented at the conference is wider," he says.

He goes on to quote the paper itself: "Virtual digital mock-ups provide an interesting framework to experiment with new design alternatives. However, we must guarantee that the perceptual evaluation that is obtained using virtual prototypes is similar to the response that is obtained using stimuli based on the real product."

As Lumen's work demonstrates, it is not just branding effectiveness or POS impact which can be tested. "We use eye-tracking technology for usability, information hierarchy, return-on-investment (ROI) evaluation and sales forecasting," says Hurley at Clemson.

In one recent example, his team worked on a project to "understand where and how people locate information on packaging and store signage". The aim was to reduce the amount of time consumers spent looking for the right product in a given category.

Competing claims for labelling space on crowded packaging make research into consumer attention and search patterns more important than ever. Says Follett at Lumen: "One of the most important findings of eye-tracking research is that just because people can read something on a pack doesn't mean that they will read it. Health information is often relegated to borderline-unreadable fonts on the back-of-pack – or slapped thoughtlessly on to the front. It may be that neither approach is particularly effective at getting people to actually engage with this important information."

Clemson's research for Avery Dennison showing (l.) a 'Gazeplot' and (r.) a 'Heat Map'

So how might eye-tracking develop in future, both in terms of the technology and how it is applied? One of the key global hardware and software specialists in this area is Swedish company Tobii, supplying Clemson's CUshop among others. The company claims that the latest version of its Analyzer software, used with the Tobii Pro Glasses 2 for eye-tracking in the real world, will help to speed up the data analysis process, and so make any study more convenient, efficient and cost-effective.

But improvements have not come in any sort of linear, upward progression. As Clemson's Hurley explains, the first generation of Tobii mobile glasses were aimed more squarely at packaging and retail analysis. But this is now "just a small subset of eye-tracking technology", so that specific relevance to packaging applications was unlikely to stay.

Of the second-generation glasses, he says: "'Coding' data is a laborious task; especially difficult for shelf sets with hundreds of products nested tightly together. Our back-end processing time with the latest technology has increased tenfold over the previous generation of hardware."

Hurley believes that the future of eye-tracking in a packaging setting lies with computer vision. "Analytics will be amazingly fast and – with time – super accurate," he predicts.

The benefits are likely to go beyond speed. At Lumen, Follett points out: "Eye-tracking is currently difficult and expensive to do at scale, which can make conducting statistically-significant studies both time-consuming and expensive."

The company has investigated ways of cutting the time and costs associated with research, and concluded that the 3D virtual store is one way of doing both. "As they explore, we can track shoppers' attention in these environments and conduct large-scale studies quickly and cheaply, making eye-tracking something that even the smallest food manufacturers or retailers could afford," Follett explains.

Contero at Valencia foresees a time when virtual reality (VR) head-mounted displays will be the norm for eye-tracking research – and not only for research. It is anticipated that, at some point, VR will be able to create ultra-realistic immersive environments. "Probably, in the future, some kinds of products will be available to buy through immersive VR shopping," he says. "This means that new tools to analyse eye-tracking in this context will be needed."

He adds: "Software for eye-tracking analysis should evolve to provide new tools for data analytics inside the VR environment."

At Clemson, Hurley sees further changes on the horizon. "Eye-tracking will just be one of many biometric tools to understand why people make decisions," he suggests.

In a sales context, answers to the question 'why?' have been the most elusive.

"Wouldn't it be interesting to know that your label created joyful emotions, yet the closure created many instances of contempt?" he asks. "But in total, the emotional engagement with Design A was 82% more positive than Design B."

Technology already exists to combine devices such as Galvanic Skin Response (GSR), Electroencephalogram (EEG) and facial coding, together with their algorithms. "But the devices and software available right now are lacking the consistency and precision needed to be useful for effectively evaluating packaging," Hurley explains.

He believes: "They will soon be commonly run simultaneously with eye-tracking to produce a holistic understanding of interactions with everyday objects."

Of all these emotion-logging techniques, he predicts that facial coding will be "the next big thing". "But all of these biometrics have a long way to go to catch up with state-of-the-art eye-tracking."

cushop.sonocoinstitute.com
www.lumen-research.com/who-we-are
www.upv.es

Innovating with Packaging Logistics: Lund University, Sweden

The origins of institutes such as Lund University's Packaging Logistics Division – as well as its current success and reputation – are among the most compelling testimonials to the academic model first established by Michigan State University (MSU) in the US, and expanded during the 1980s and '90s.

Current head of the division Annika Olsson is clear about this: "It was established in 1994, started by Professor Gunilla Jönson, who drew inspiration from her guest professorship at MSU's School of Packaging."

Its areas of interest span the entire packaging lifecycle. "Packaging logistics covers the design of a product and its packaging, throughout the whole supply chain from raw product, via various actors, to the end user, and on to recycling and recovery," says Olsson.

Naturally, while emulation of other university packaging departments may have been the starting point, this new IAPRI member has since developed a very distinctive character of its own.

PhD student Katrin Molina-Besch and MSc students

In part, this is to do with the division's academic environment. "We belong to the Design Science department, where we work together with Innovation Engineering," she explains. "Design Science is in turn part of the Engineering Faculty at Lund University, and we have several ongoing collaborations both within the faculty (within traffic planning and environmental studies), as well as with other faculties – for example, the business school in projects about retail."

The division has grown over the intervening years. "From being just Gunilla Jönson with one PhD student enrolled and about 20 MSc students, there are now about 30 people in the division, including PhD students (around 10), faculty (about 10) plus around 10 project workers and administration staff," says Olsson. "We further engage some 100 Masters students in our courses every year."

Design Sciences has good and relatively new facilities, she says. Recent investment has included 3D printing equipment, which the division is utilising in its current research and education.

'We have ongoing collaboration with Stellenbosch University and Sao Paulo State University'

Courses start at Masters level, where the Food Innovation and Product Design (FIPDes) programme has recently been added to existing engineering programmes such as Chemistry (food), Biotechnology, Machine Design and Industrial Engineering. An advanced project course in food and packaging innovation has been introduced into the FIPDes programme, which is an Erasmus Mundus EU consortium.

Industry is closely involved both in the course projects inserted into the curriculum and in the MSc thesis projects, which are always carried out collaboratively with business.

Current research projects at PhD level and beyond include: pharmaceutical packaging design innovation for the elderly; minimising food waste using freshness and shelf-life indicators; and sustainable packaging for the automotive industry.

Meanwhile, this year's crop of MSc research projects spans topics as diverse as: developing direct food-contact board packaging; using e-commerce packaging to improve the customer experience; and the light barrier properties of different pack formats.

International co-operation is important for the division. "We have ongoing collaboration with Stellenbosch University [in South Africa] as well as with Sao Paulo State University [in Brazil] in teaching and research," says Olsson. "On the teaching side, we collaborate with MSU, and hope to strengthen this relationship also within research."

Joining IAPRI fits in with this international orientation. "Being involved with a network organisation always provides good opportunities for new collaboration and knowledge-sharing, and we feel that IAPRI is at the core of our interests," she concludes.

www.plog.lth.se

www.iapri.org International Association of Packaging Research Institutes
IAPRI was established in 1971 as an international membership association to promote packaging research. It is a unique global network which allows organisations to communicate and develop ideas, exchange experiences and in many cases reduce duplication of effort.
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