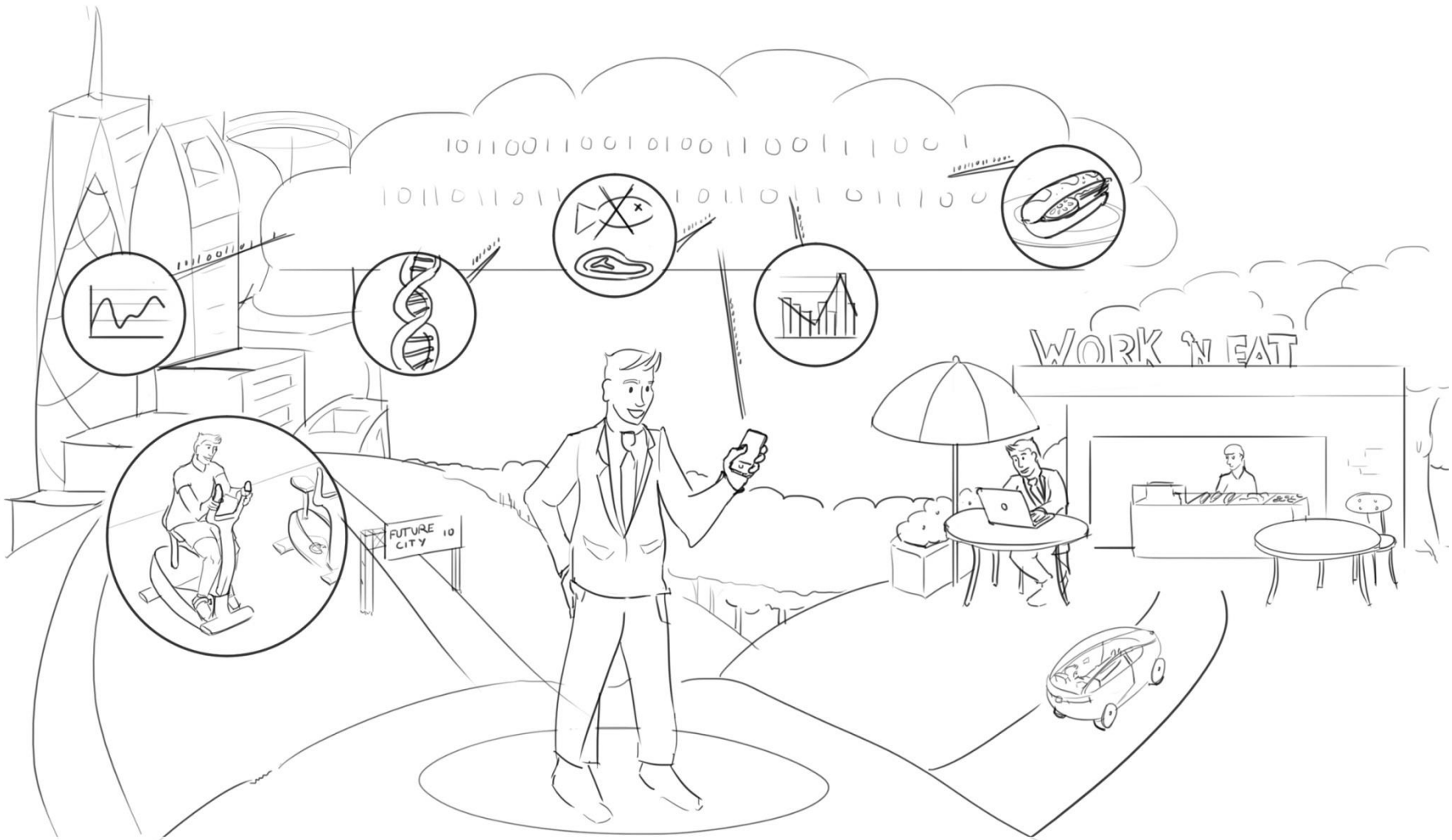
SMART PERSONALIZED NUTRITION

Pieter Debrauwer

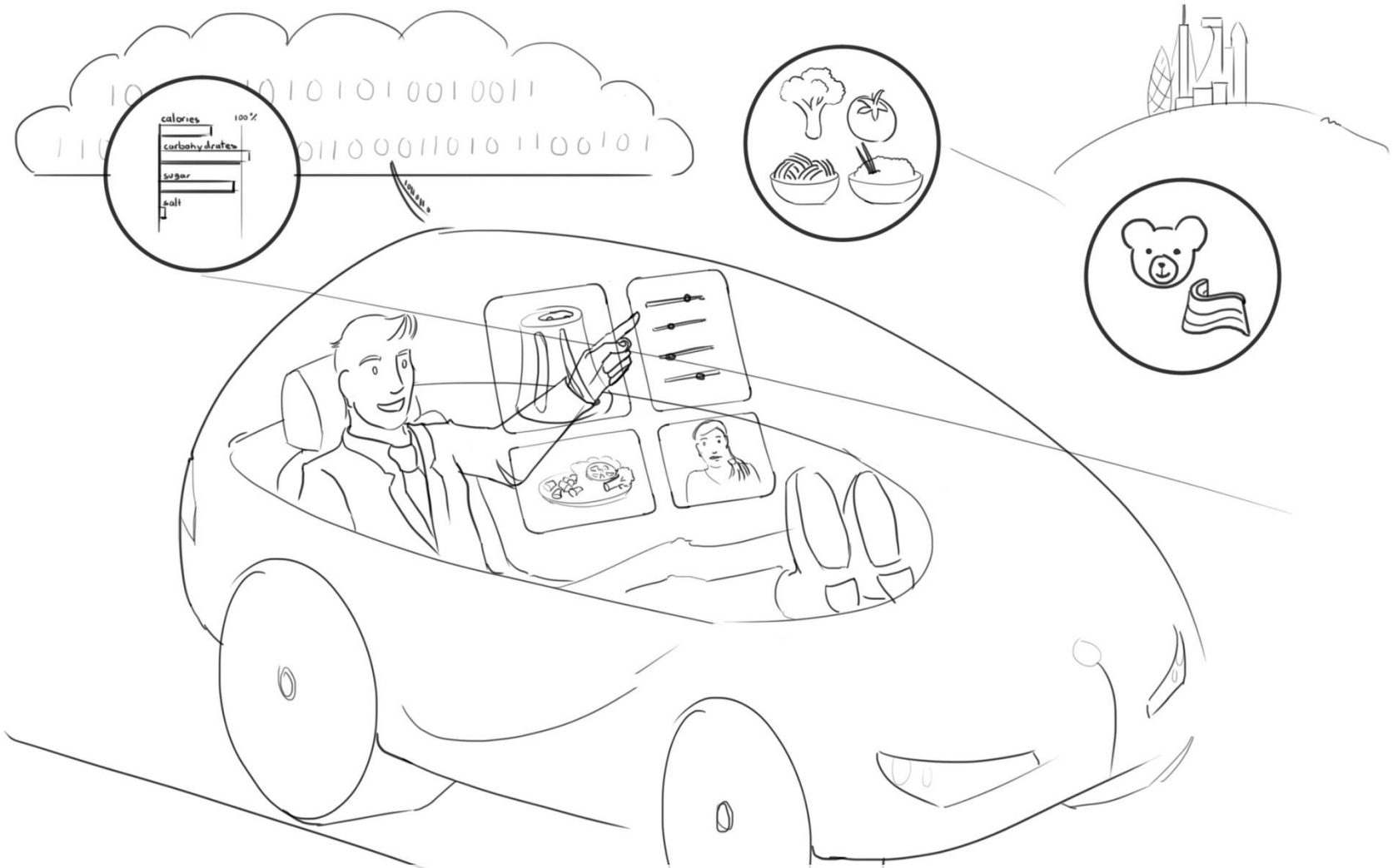
TNO innovation for life

Quantified Self will provide huge amounts of behavioural and health data

Health Cloud will store this information for millions of users

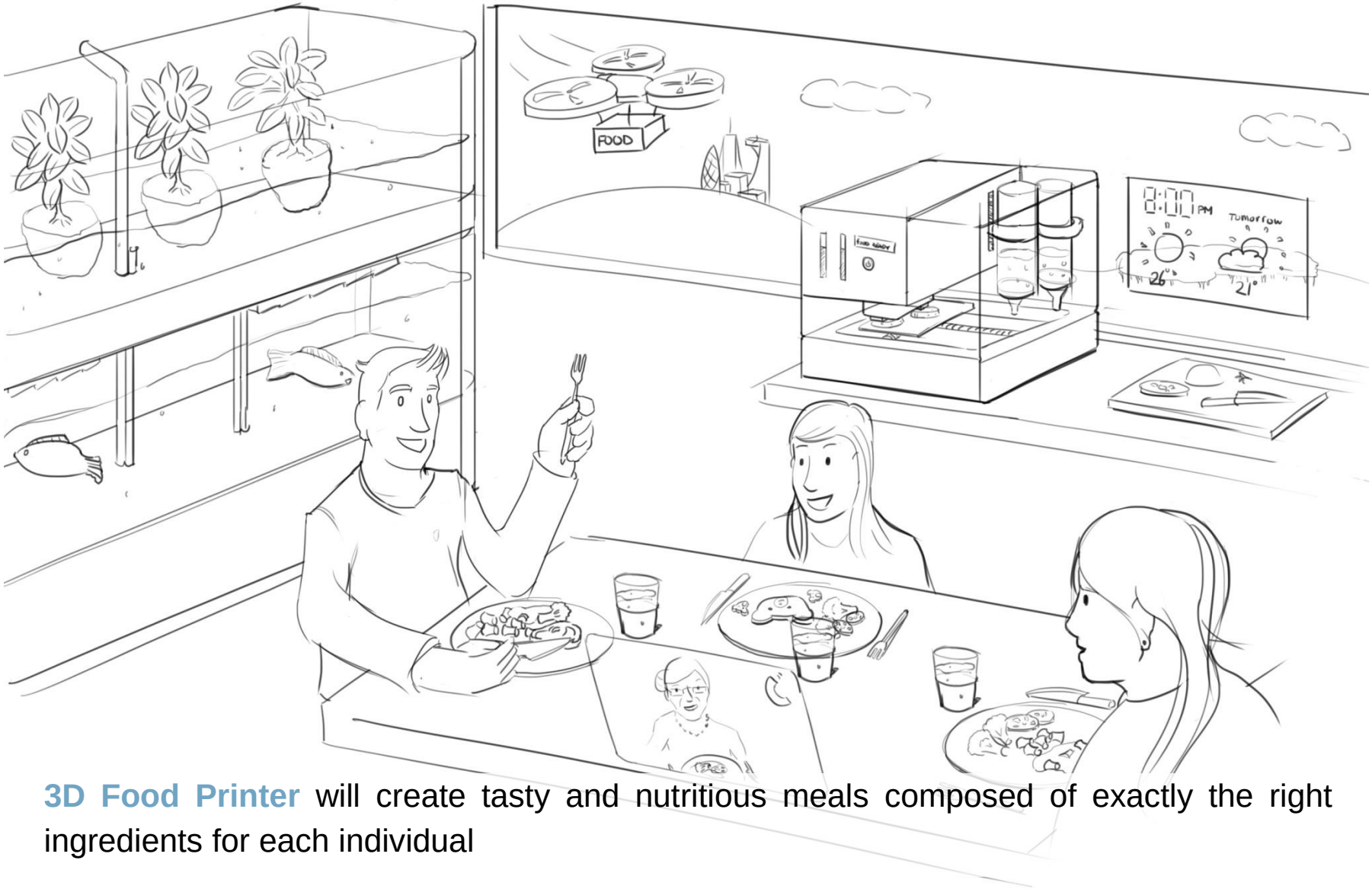


Logging of activities – working, eating, sports – in the health cloud



Health Cloud will provided info on healthy, personalized food choices

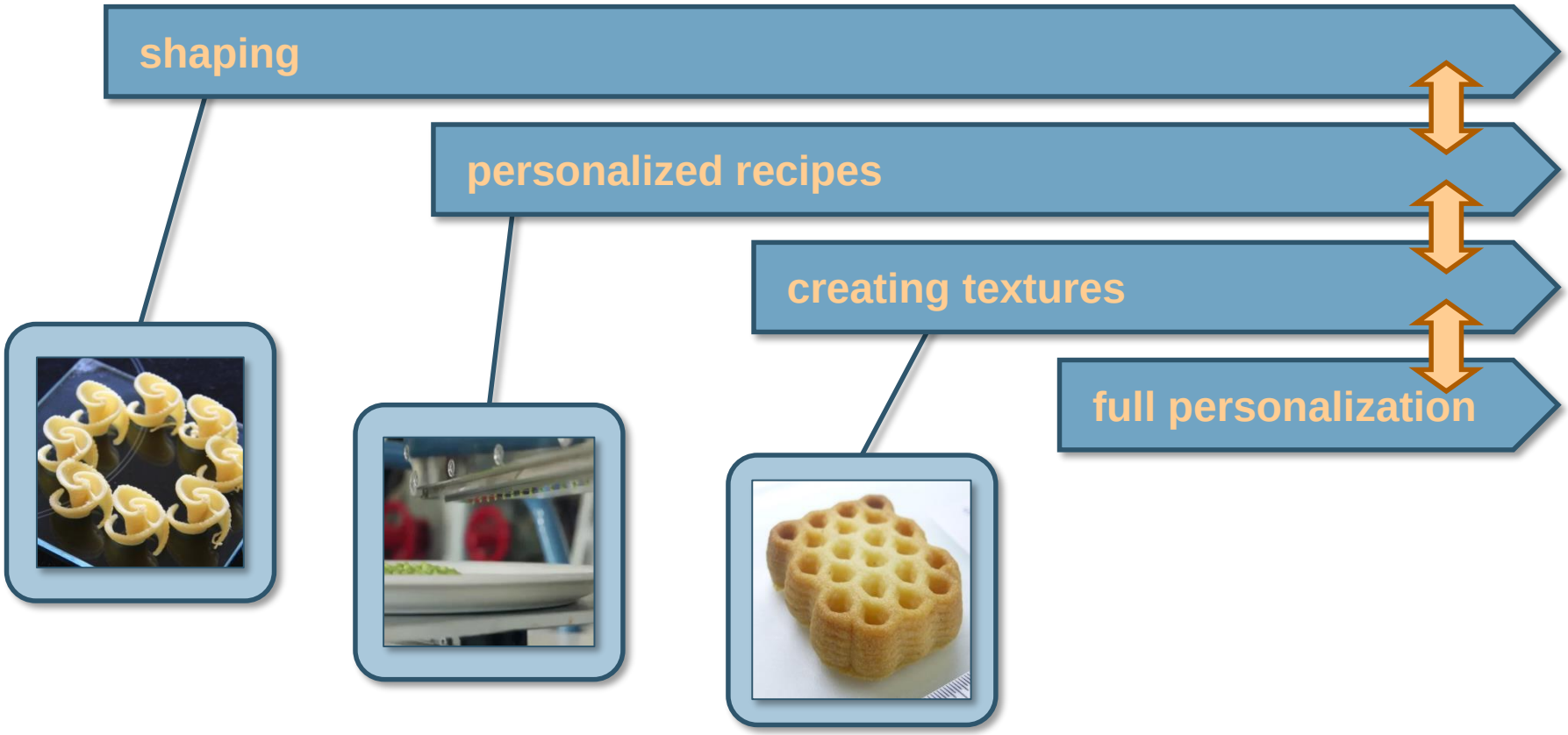
Digital Cooking to create fully personalized meals (composition, texture, taste, shape)



3D Food Printer will create tasty and nutritious meals composed of exactly the right ingredients for each individual

TNO FOOD PRINTING ROADMAP

timeline




THANK YOU FOR YOUR ATTENTION
TNO
innovation
for life

WHY PRINT FOOD?

PERSONALIZED FOOD & WELL BEING

DESIGN FREEDOM & NEW FOODS

ALTERNATIVE INGREDIENTS

FLEXIBLE, DECENTRALIZED PRODUCTION

CONVENIENCE

SOCIAL EXPERIENCE

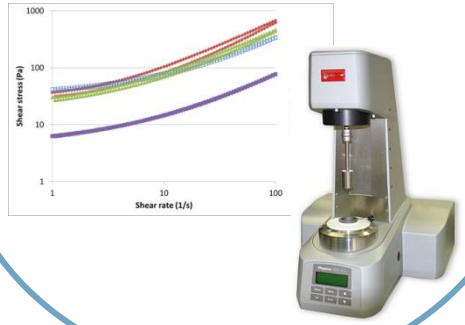
Innovation: social media supported recipes and cooking

Drivers: “pre and post fun”, (hosted) 3D food printing communities

FOOD PRINTING = MULTI-DISCIPLINARY

Novel applications

Food physics



Printing equipment

3D PRINTING

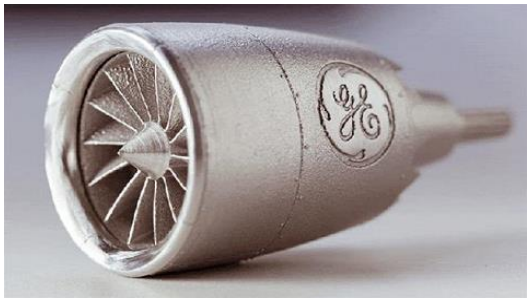
RECENT INDUSTRY DEVELOPMENTS

3D PRINTING IS MATURING

HP wants new Oregon 3D printing materials lab to be 'catalyst for innovation'

Mar 16, 2017 | By Benedict

Printing giant HP has unveiled a new 3D Open Materials and Applications Lab at its Corvallis, Oregon site. HP says the 3,500 sq ft space will increase cross-industry collaboration, allow partners to test new 3D printing materials for the HP Jet Fusion 3D printer, and decrease time-to-market.

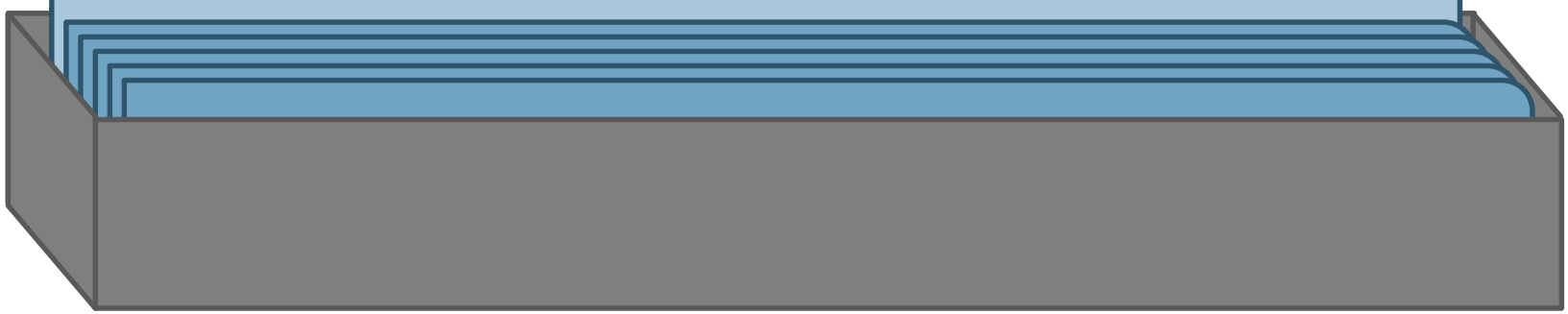


WHY PRINT FOOD?

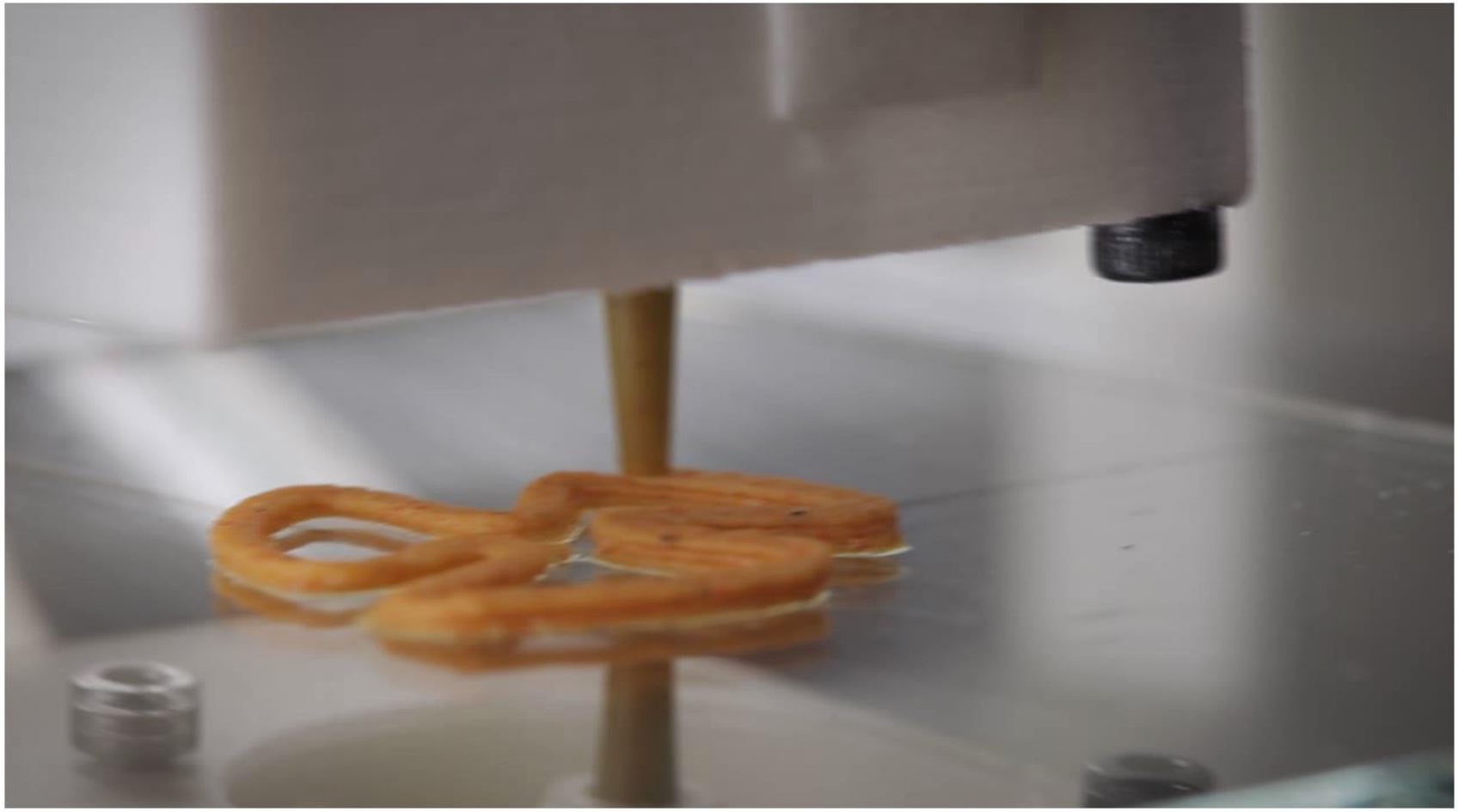
DESIGN FREEDOM & NEW FOODS

Variations: innovative shapes, textures, flavors, etc.

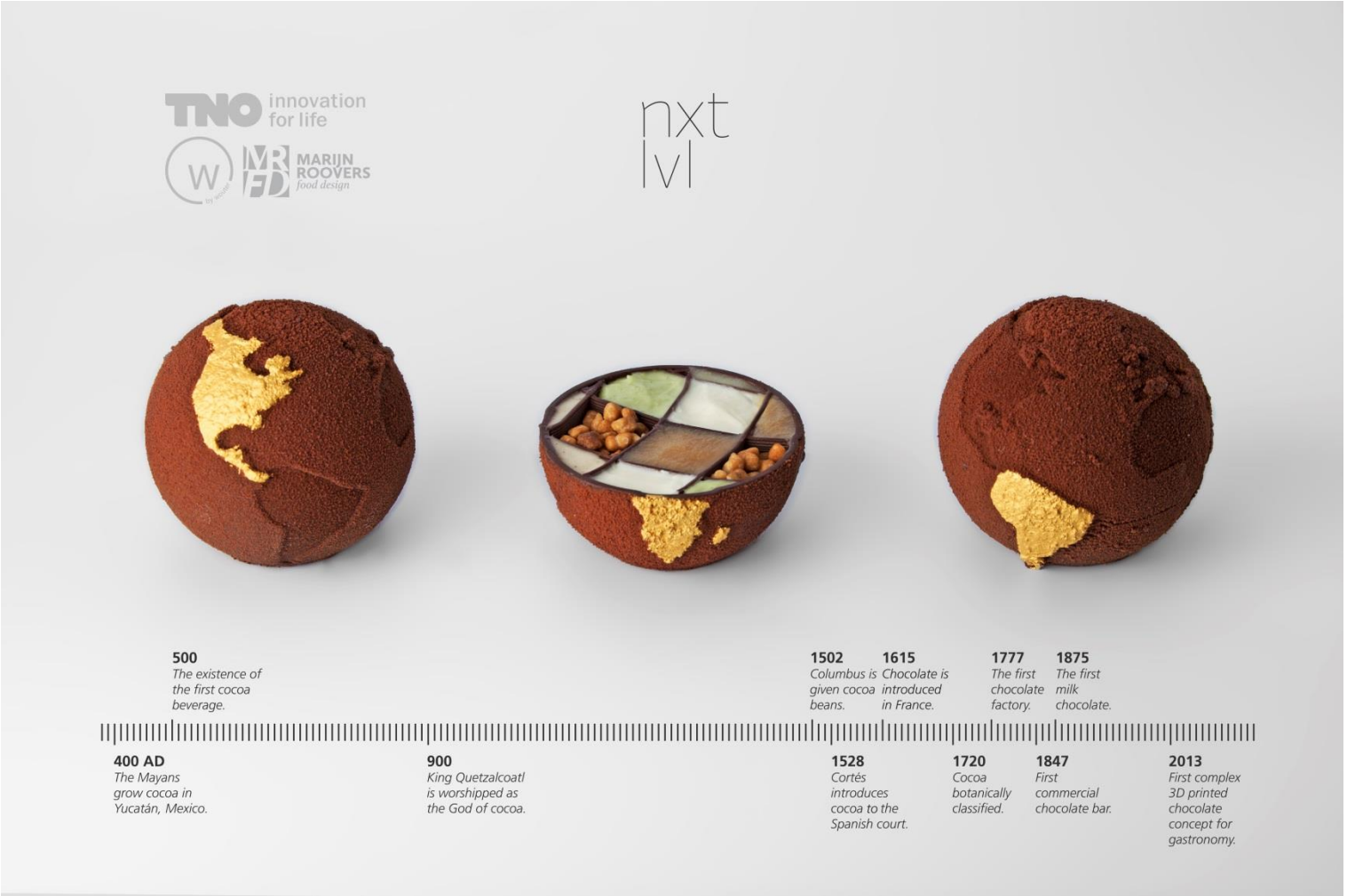
Drivers: new product concepts, customer-centricity, fun!



FUSED DEPOSITION MODELING (FDM)



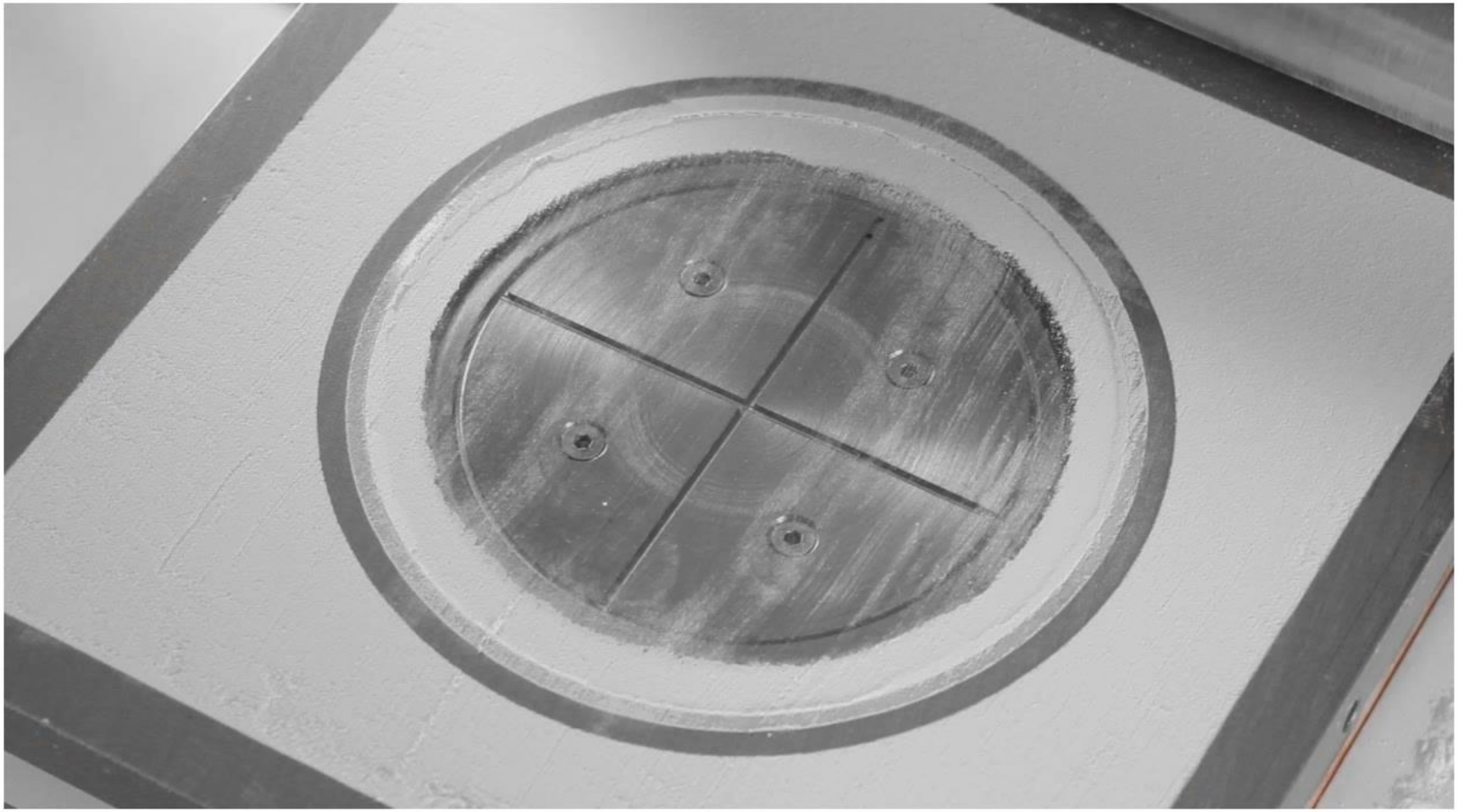
MICHELIN STAR CHOCOLATE DESSERT



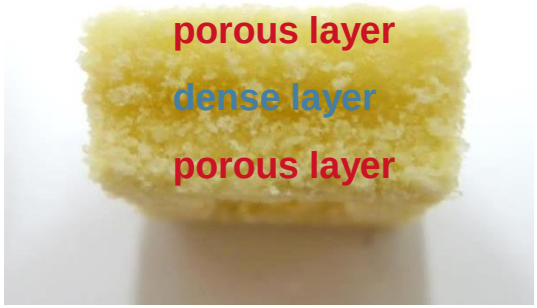
SELECTIVE LASER SINTERING (SLS)

DESIGNED POROUS TEXTURE

POWDER BED PRINTING (PBP)



MULTI-TEXTURE CAKE-TYPE PRODUCT



shape after baking

WHY PRINT FOOD?

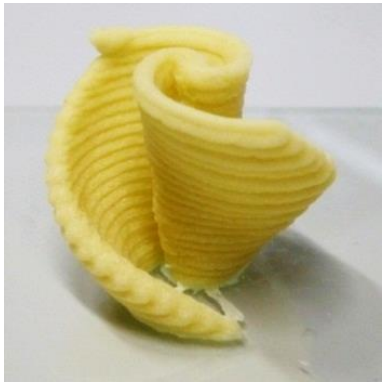
DESIGN FREEDOM & NEW FOODS

FLEXIBLE, DECENTRALIZED PRODUCTION

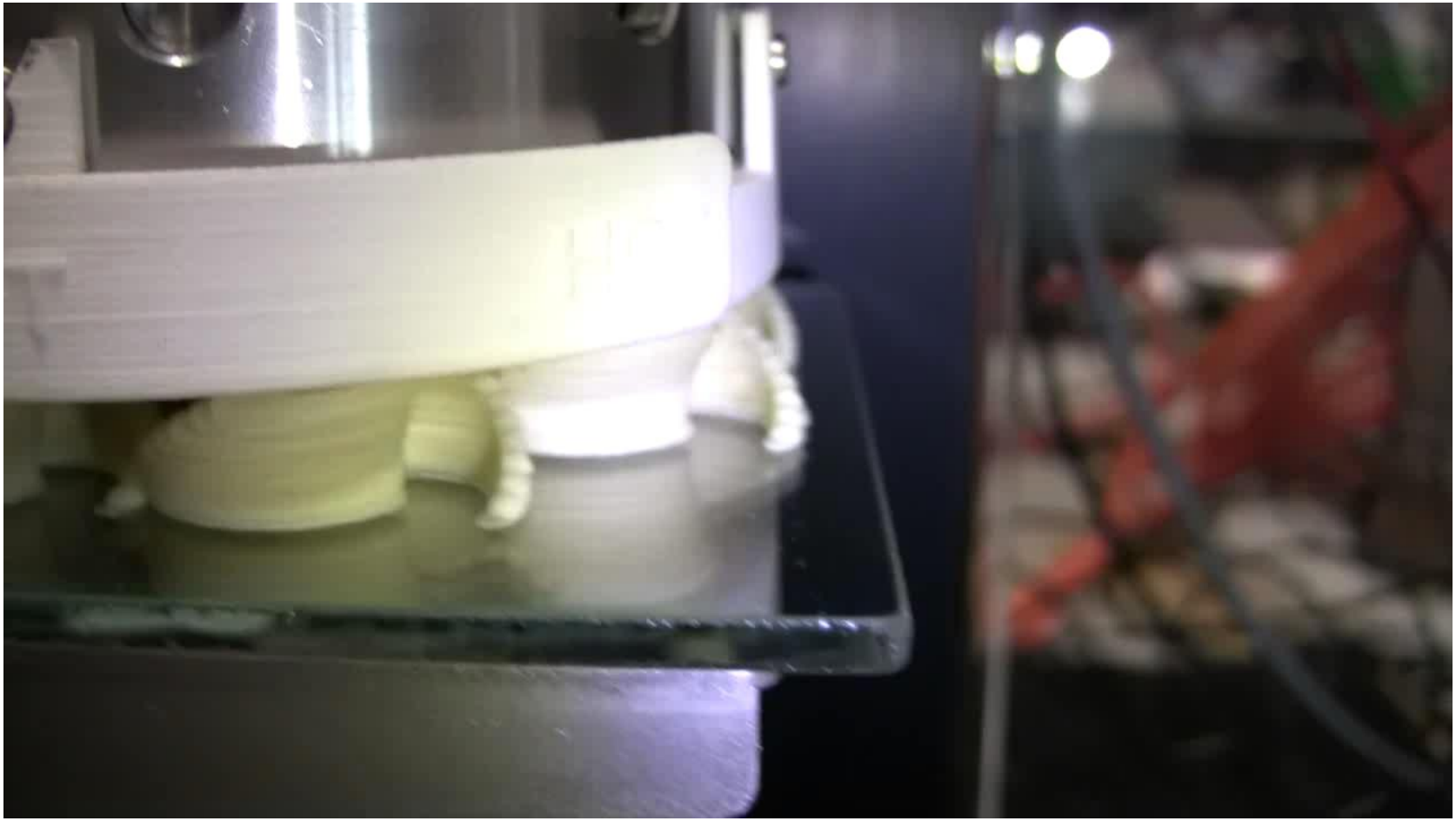
Variations: local, efficient production using local resources

Drivers: freshly prepared food where you want it, new distribution/supply chains

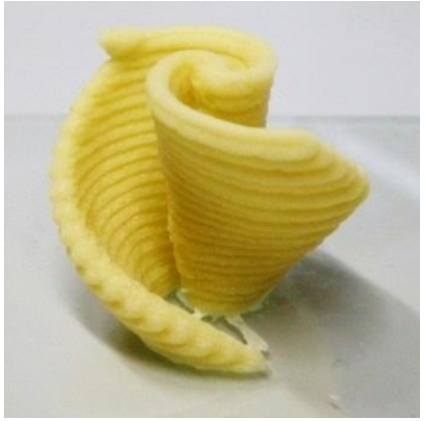
PRINTED PASTA



PRINTING WITH 8 NOZZLES



PRINTING SPEED INCREASE



1 piece in 15 min
= 900 sec/piece

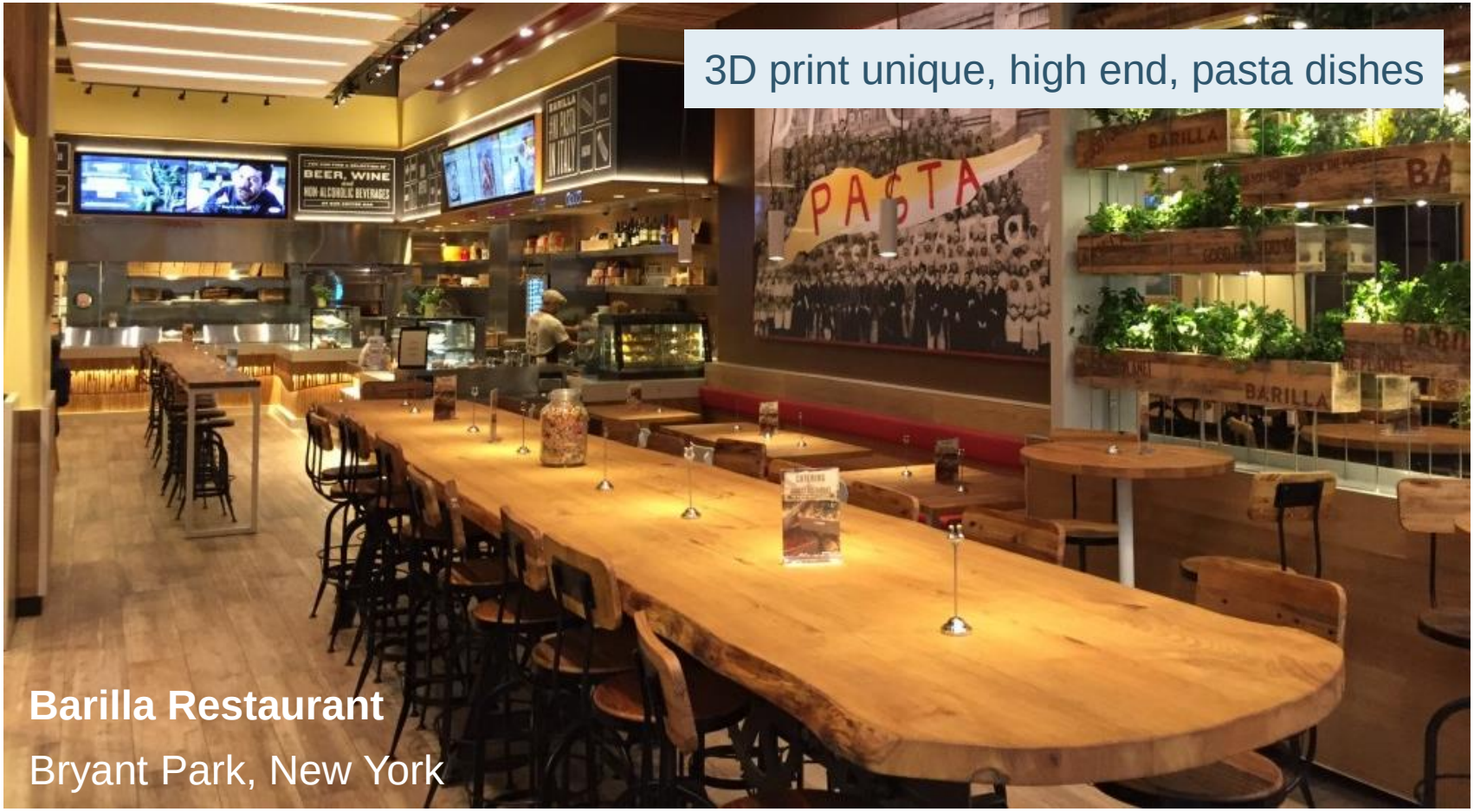
4 pieces in < 2 min
= 26 sec/piece

8 pieces in < 2 min
= 13 sec/piece

Restaurant use

Goal: 1 plate of pasta in < 2 minutes

LOCAL PASTA PRODUCTION



3D print unique, high end, pasta dishes

Barilla Restaurant

Bryant Park, New York

WHY PRINT FOOD?

DESIGN FREEDOM & NEW FOODS

FLEXIBLE, DECENTRALIZED PRODUCTION

PERSONALIZED FOOD & WELL BEING

Variations: ingredients, composition, flavors, shapes, size

Drivers: health/medical, lifestyle, (dis)likes. Individualized products

PERSONALIZED FOOD PRINTING

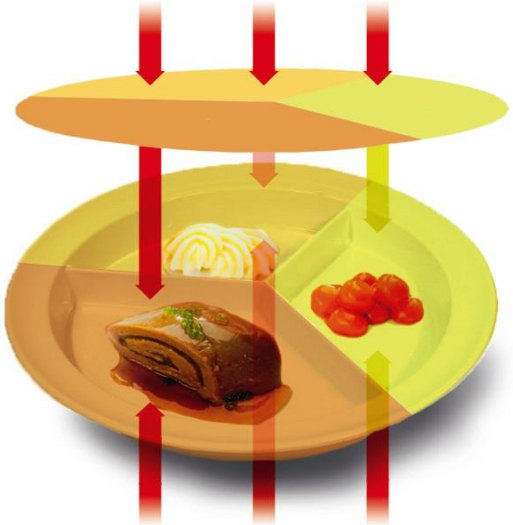
PERFORMANCE
Personalised Food for the Nutrition of Elderly Consumers

“Yesterday”

leg of chicken mash

“Today”

hand-made, shaped
leg of chicken
(non-personalized)

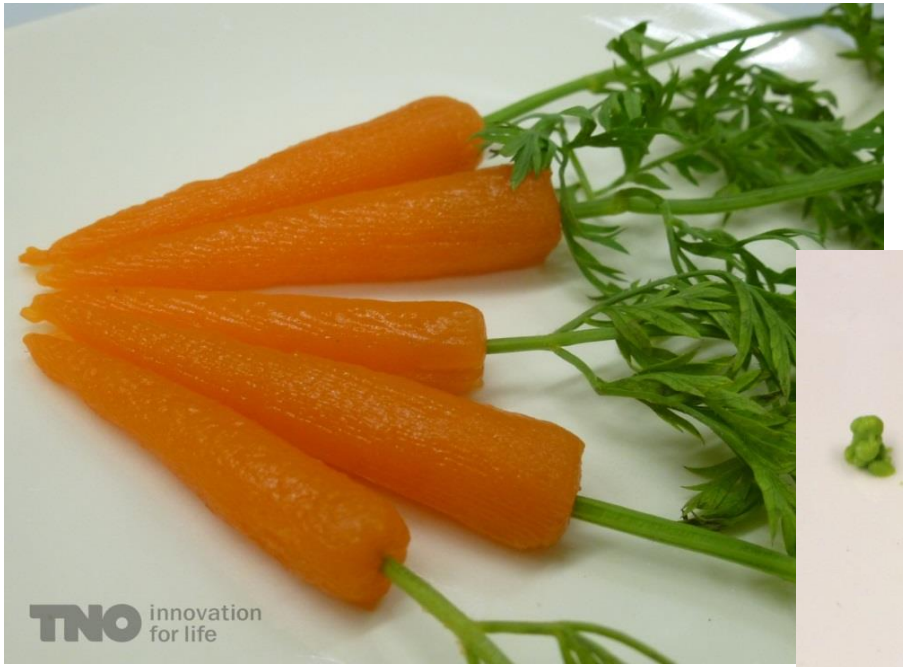


“Tomorrow”

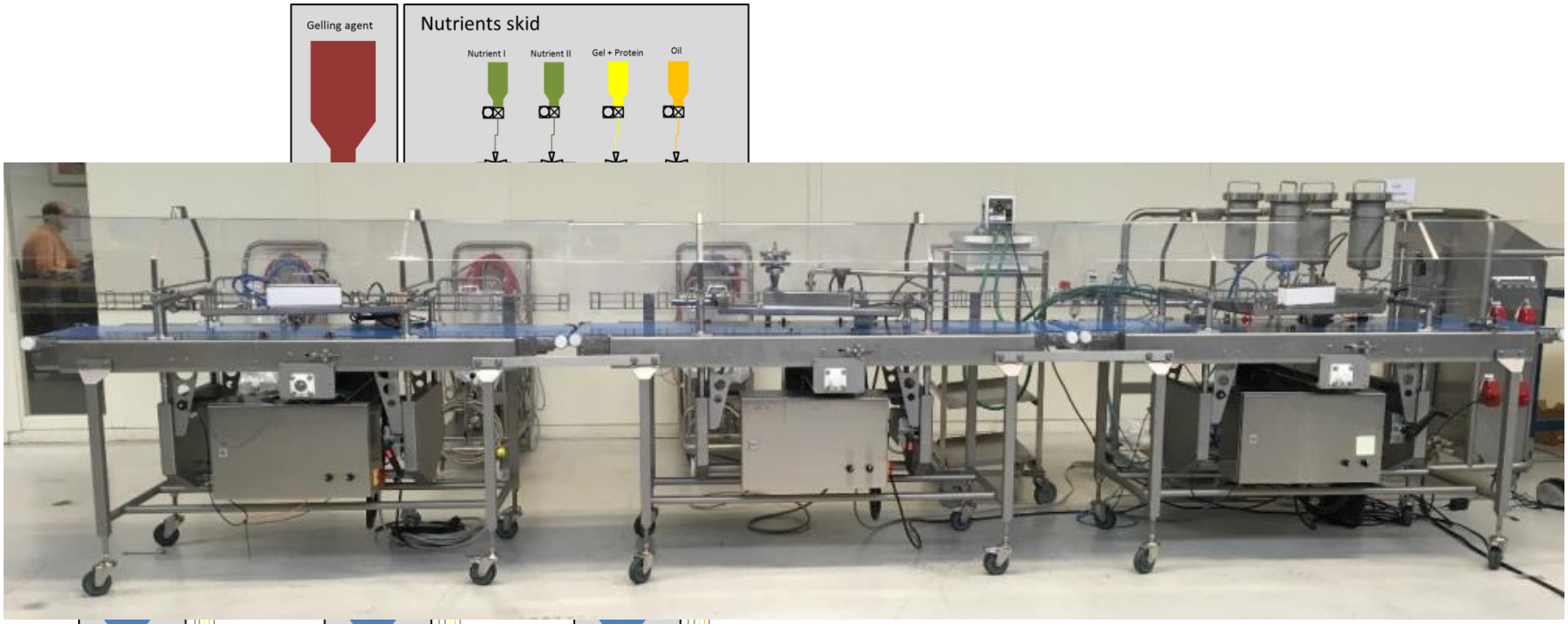
PERFORMANCE meals
personalised & shaped meals,
industrially manufactured

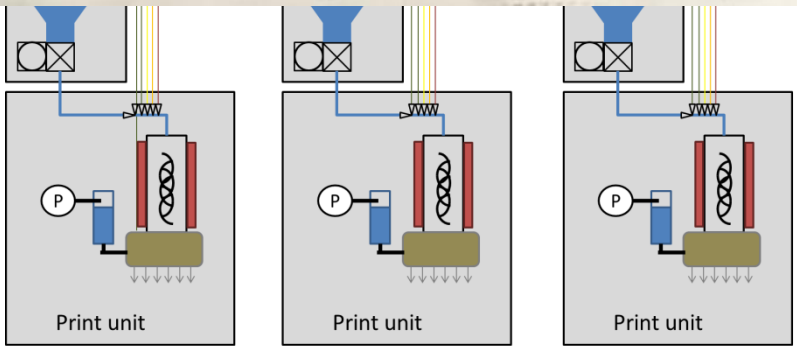
INKJET PRINTING (IJP)

PERSONALIZED MEDICAL NUTRITION



MIXING AND PRINTING SETUP





Capacity
20-60 fully personalized meals per hour (e.g. meat, potatoes, vegetables)

Personalized
composition, caloric content, size, hardness

“2.5D PRINTING” – FOODJET

WHY PRINT FOOD?

DESIGN FREEDOM & NEW FOODS

FLEXIBLE, DECENTRALIZED PRODUCTION

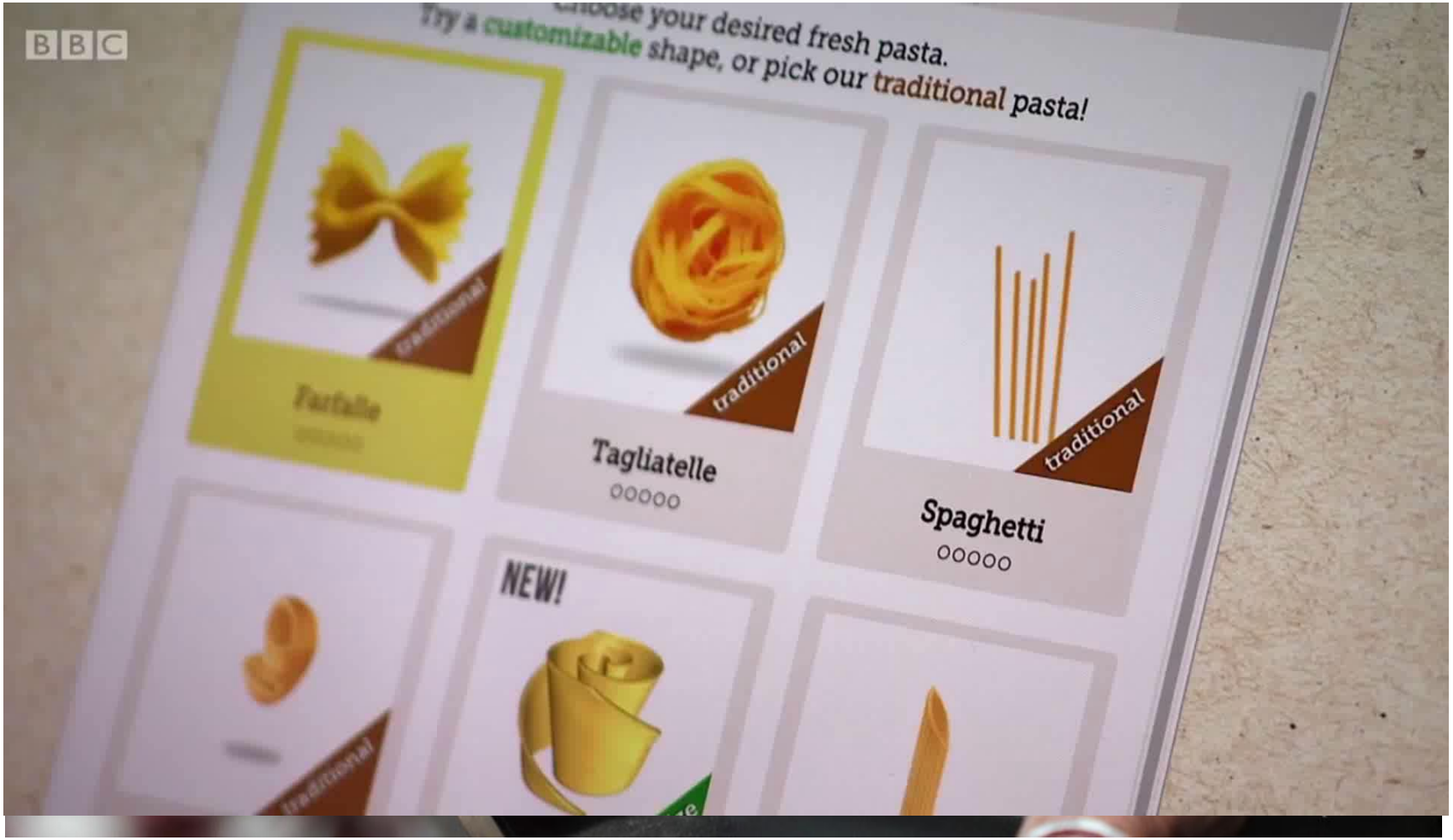
PERSONALIZED FOOD & WELL BEING

SOCIAL EXPERIENCE

Innovation: interactive / social media supported recipes and cooking

Drivers: “pre and post fun”, (hosted) 3D food printing communities, e-commerce. The sharing economy!

DIGITAL CONNECTION WITH CONSUMERS



WHY PRINT FOOD?

DESIGN FREEDOM & NEW FOODS

DESIGN FREEDOM & NEW FOODS

FLEXIBLE, DECENTRALIZED PRODUCTION

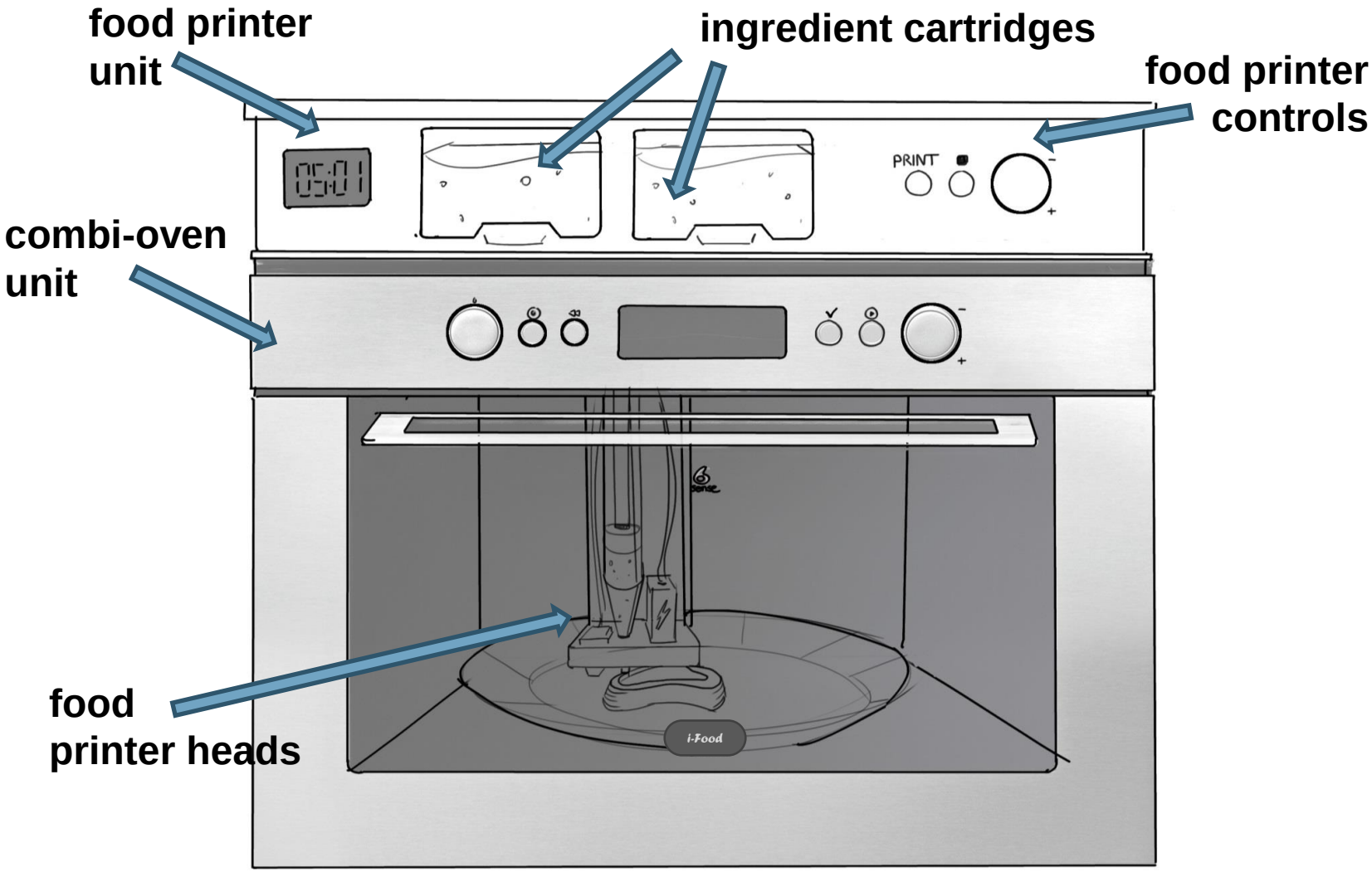
SOCIAL EXPERIENCE

CONVENIENCE

Innovation: “personal chef + microwave”

Drivers: freshly prepared personalized food where and when you want it

INTEGRATION



MULTI-COMPONENT PRINTED SNACK