## APP1 – Post launch analysis of detergent pouch APP2 – Detergent pouch systems

#### End-user partner: Translator partner:





a Partners in Performance company

**Procter&Gamble** 







## **APP1 Business Case**



**IONTO**TRANS

The challenge is the fast analysis of large datasets to assess in-market initiative success. Key Performance Indicators KPI's include product pricing, product size/number of jobs, retailer, numerical distribution, i.e., the presence of product on the shelf, product and package attributes.

The sought benefit is to rapidly react to the change of market reality, competitive initiatives, economic drivers and distribution, to offer the best possible product line-up to consumers.

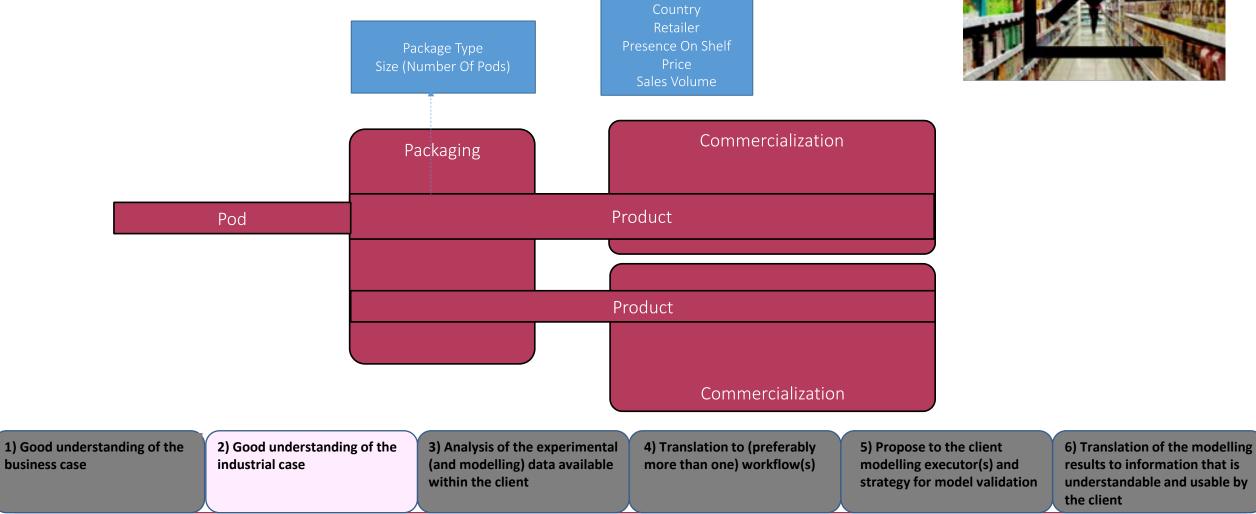
1) Good understanding of the business case

2) Good understanding of the industrial case 3) Analysis of the experimental (and modelling) data available within the client 4) Translation to (preferably more than one) workflow(s)

5) Propose to the client modelling executor(s) and strategy for model validation 6) Translation of the modelling results to information that is understandable and usable by the client

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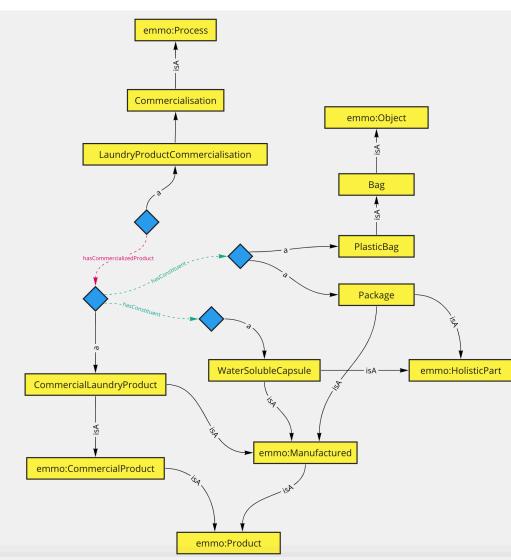
### **APP1 Industrial Case**





## **APP1 EMMO Compliant Application Ontology**

ommercialLaundryProdu





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Commercialization Properties

| n.a. = not applicable (nonsense)<br>n.r. = not relevant (makes sense but useless)   | Property Names Property Description (semantics) |   | Data Description (symbolic)     |  |                               |  |
|---|---|---|---------------------------------|--|-------------------------------|--|
| o.s. = out of scope (makes sense at could be<br>important but not under this scope) |   |   | Data Type                       | Data Range                                 | Units                         |  |
|   | Country Identifier                              | Name of the country of Commercialization  | String                          | Enumeration of<br>countries                | n.a.                          |  |
|   | Retailer Identifier                             | Name or code of the retailer  | String                          | Enumeration of retailers                   | n.a.                          |  |
| Commercialization   | Product Price                                   | Price of the package as defined by the retailer.                                    | Real Scalar                     | [0,Inf[                                    | Currency                      |  |
|   | Presence on Shelf                               | The % of shops handling the product according to retailer policy.                   | Real Scalar                     | [0,100]                                    | %                             |  |
|   | Sales Volume                                    | Units sold per week   | Real Scalar                     | [0,Inf[                                    | hundreds of<br>units per week |  |
|   | Components Performance                          | Product performance from multi-dimensions to evaluate product features for capsules | Integer Vector<br>of 9 elements | [0,100]                                    | n.a.                          |  |
| WaterSolubleCapsule   | Perfume Boost Technology                        | Specific perfume existing   | Boolean                         | {true,false}                               | n.a.                          |  |
| WaterSolubleCapsule hasproperty>  | Perfume Type                                    | Perfume name to apply to capsules   | String                          | Enumeration according to PGBS nomenclature | n.a.                          |  |
|   | Perfume Level                                   | Amount of perfume in a capsule.   | Real Scalar                     | [0,1]                                      | % w / w                       |  |
| and a state of the state  | Dissolution Time                                | Time for complete dissolution of the capsule.                                       | Real Scalar                     | [0,Inf[                                    | min                           |  |
| <mark>nmercialLaundryProduct</mark> h <sub>asProperty</sub>                         | Product Size                                    | Number of pods contained by the shelf product.                                      | Integer Scalar                  | [0,Inf[                                    | n.a.                          |  |
| PackagehasProperty  | PackageType                                     | Package type.   | String                          | {box, bag}                                 | n.a.                          |  |

## **APP 1 Data and Metadata Curation**



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#### **DATA SOURCE & CURATION**

- In-market data are purchased by PGBS through external vendors
- The data are stored within PGBS database and regularly updated
- Data are verified by the vendor and at the time of uploading to PGBS database

| 1) Good understanding of the business case | 2) Good understanding of the industrial case | 3) Analysis of the experimental<br>(and modelling) data available<br>within the client | 4) Translation to (preferably more than one) workflow(s) | 5) Propose to the client<br>modelling executor(s) and<br>strategy for model validation | 6) Translation of the modelling<br>results to information that is<br>understandable and usable by |
|--|--|--|--|--|---|
|  |  |  |  |  | the client  |

### **APP 1 Models**



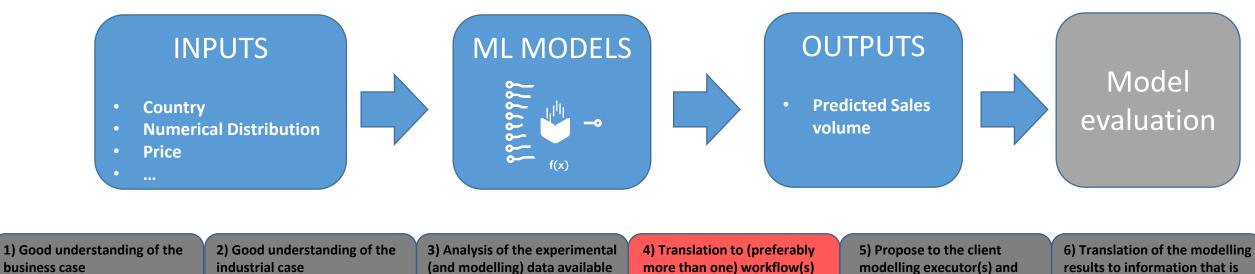
understandable and usable by

the client

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 Data are regressed with a machine learning model to predict the sales volume as a function of numerical distribution and price for 3 European countries (Germany, France and UK) and for each product in the market.

within the client



strategy for model validation

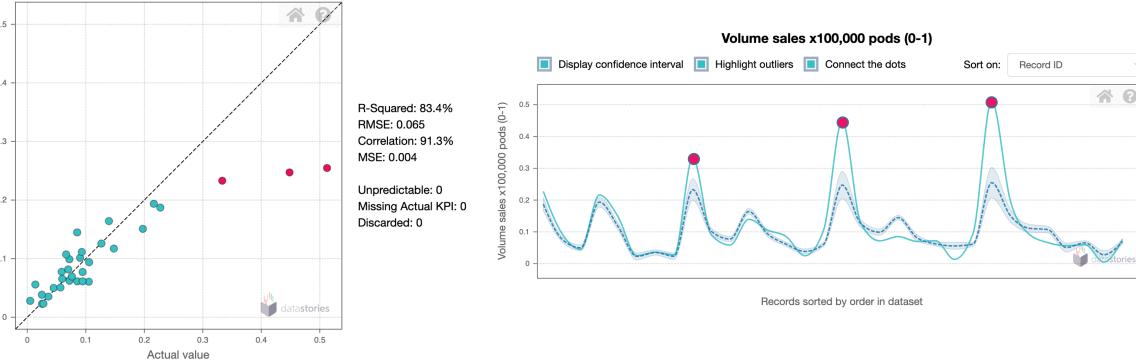
#### **Model Validation**

Volume sales x100,000 pods (0-1) 0.5 Display confidence interval 0.4 R-Squared: 83.4% Volume sales x100,000 pods (0-1) RMSE: 0.065 0.4 Correlation: 91.3% 0.3 Prediction MSE: 0.004 0.3 Unpredictable: 0 0.2 Missing Actual KPI: 0 Discarded: 0 0 0.1 atastories 0.1 0.2 0.3 0.4 0.5 0 Actual value

1) Good understanding of the 2) Good understanding of the 3) Analysis of the experimental 4) Translation to (preferably 5) Propose to the client 6) Translation of the modelling modelling executor(s) and industrial case (and modelling) data available more than one) workflow(s) results to information that is business case within the client strategy for model validation understandable and usable by the client

Second OntoTrans Open Workshop, 07.09.2023, Hybrid







#### 

## **APP1 Interface**

#### **APP1: Post-Launch Analysis**

| Good unde<br>siness case | rstanding of the     | 2) Good understandin<br>industrial case | g of the 3) Analysis of the exp<br>(and modelling) data<br>within the client |          |
|--------------------------|----------------------|---|--|----------|
| Train m                  | odel                 |   |  | Ev       |
| 2021/01                  | /10 – 2022/05/29     |   |  | 0.00     |
| Reference                | period               |   |  |          |
| 3                        |                      |   | 102  | Price    |
| Number of                | jobs                 |   | 102  | 0.00     |
| ARIEL                    |                      |   | •  | GTIN     |
| Brand                    |                      |   |  | Mode     |
| FRANCE                   |                      |   | •  | GT       |
| Country                  |                      |   |  | GT       |
| Or define                | a scenario:          |   |  | GT<br>GT |
| None                     |                      |   | •  | GT       |
| Select a GT              | IN                   |   |  | Sco      |
| Model train              | ing Model evaluation |   |  | Мо       |

| erimental 4) Translation to (preferab<br>available more than one) workflow(                          |  | ose to the<br>ng execut |            | 6) Translation of the modelling results to information that is |
|--|--|-------------------------|------------|--|
| Evaluate   |  |                         |            |  |
| 0.00   |  |                         | 1.00       |  |
| 0  | .50  |                         |            |  |
| Price (training range: 0.52-0.65)  |  |                         |            |  |
| 0.00   |  |                         | 1.00       |  |
|  | .50  |                         |            |  |
| Numerical distribution (training range: 0.14-0.70)   |  |                         |            |  |
| GTIN-8001841568805 from 2021-01-10 to 2022-05-29   | 2023-03-07 0                               | 0:15:40                 | 93%        |  |
| Model  | Created on                                 |                         | Quality    |  |
| GTIN-8001841568805 from 2021-01-10 to 2022-05-29   | 2023-03-07 00:16:42                        | done                    | 93%        |  |
| GTIN-8006540082362 from 2021-01-10 to 2022-05-29   | 2023-03-07 01:14:31                        | done                    | 62%        |  |
| GTIN-8001841568805 from 2021-01-10 to 2022-05-29   | 2023-03-07 00:14:36                        | done                    | 93%        |  |
| GTIN-8001841568805 from 2021-01-10 to 2022-05-29   | 2023-03-07 00:17:30                        | done                    | 93%        |  |
| GTIN-8006540180327 from 2021-01-10 to 2022-05-29<br>GTIN-8001841568805 from 2021-01-10 to 2022-05-29 | 2023-03-07 01:37:54<br>2023-03-07 00:15:40 | done<br>done            | 65%<br>93% | Var Mark   |
| Scenario Country: FRANCE Brand: ARIEL Jobs: 22-29 fro  | 2023-03-07 02:11:15                        | done                    | 82%        |  |
| Model  | Creation date                              | Status                  | Quality    | E TO A NUMBER OF   |
|  |  |                         |            |  |
|  |  |                         |            |  |

Model training Model evaluation



understandable and usable by

the client

strategy for model validation

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### **Technical Workflow**

Model evaluation sequence Model training sequence **Behind firewall Behind firewall** ESS OTE API ML Evaluator Translator Wizard/CLI ESS OTE API ML Trainer Translator Wizard/CLI exploration exploration desired model exploration results model, distribution, price parameters (GTIN or Country, Brand, Jobs, Ref. period) distribution, price ML training params model, distribution, price evaluation result ML training params (sales volume) ML Mo<mark>del metadata</mark> evaluation result (sales volume) ML Model metadata evaluation result ML Model metadata, ML training params (sales volume) \_\_\_\_\_ ESS Translator Wizard/CLI OTE API ML Trainer ESS Translator Wizard/CLI OTE API ML Evaluator



## **ESS: Exploratory Search System**

X Model Training Scenario Country: FRANCE Brand: ARIEL Jobs: 22-29 from 2021-01-10 to 2022-05-29

ALL PRODUCT MODEL TRAINING MODEL EVALUATION

18 results (19 milliseconds)

| Model Training Scenario Country: FRANCE Brand: ARIEL Jobs: 22-29 from   | Model Training Scenario Country: FRANCE Brand: ARIEL Jobs: 22-29 from                                      |
|---|--|
| 2021-01-10 to 2022-05-29  | 2021-01-10 to 2022-05-29   |
| ModelTraining   | ModelTraining  |
| No description  | No description   |
| Model Training GTIN-8006540180327 from 2021-01-10 to 2022-05-29   | From: 2021-01-10   |
| ModelTraining   | Jobs_from: 2.2E1   |
| No description  | Country: FRANCE  |
| Training Result Scenario Country: FRANCE Brand: ARIEL Jobs: 22-29 from<br>2021-01-10 to 2022-05-29<br>TrainingResults<br>No description | To: 2022-05-29<br>Jobs_to: 2.9E1<br>Training_type: SCENARIO<br>Brand: ARIEL<br>Results: GTIN-8006540182727 |
| Training Result GTIN-8006540180327 from 2021-01-10 to 2022-05-29<br>TrainingResults<br>No description                                   | Related Entities ()  |



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### **APP2 Business Case**



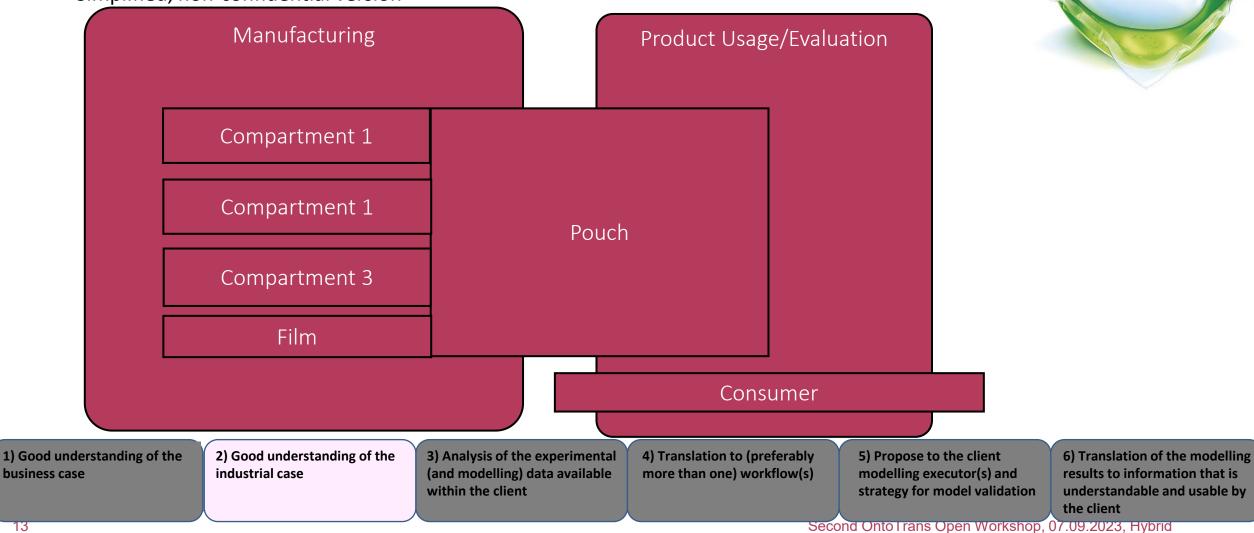
**IONTO**TRANS

The objective is the development of a more integrated, digital work process for the design of laundry Detergent Pouch Systems aiming at a 5X faster product development cycle

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|--|--|--|--|--|---|
|  |  |  |  |  | the client  |

# **APP2 Industrial Case**

Simplified, non-confidential version



## **APP 2 Data and Metadata Curation**

#### **DATA SOURCE & CURATION**

- Formulas composition is stored in PGBS databases along with related experimental and/or predicted properties:
  - Performance
  - Shelf stability
  - Consumer and industrial safety
  - Sustainability
  - Cost
- Based on the product performance and package, the purchase like hood across selected European countries can be modelled using consumer models developed as part of this program

1) Good understanding of the business case

14

3) Analysis of the experimental (and modelling) data available within the client 4) Translation to (preferably more than one) workflow(s)

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## **APP 2 Models**

DETERGENT POUCH SYSTEMS: Agile response to product, market and regulatory requirements / (PGBS and DATASTORIES)

#### Outputs

- Performance, sustainability, cost, stability, safety of each solution
- The output of the solution is processes through
  - A model computing the character of the perfume in each formulation in comparison to that of the reference product. Product with significant character change will be discarded
  - A model computing the like hood of purchasing vs the reference. Products with low purchasing likehood will be discarded

#### **Computed properties of each formulation:**

- Performance
- Stability
- Sustainability
- Safety
- Cost

#### Filter solution matching success criteria

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#### Perfume character prediction:

- Likeability vs reference

Filter solution with not character deviation

#### **Consumer purchase intent prediction:**

- Purchasing likehood

#### Lead formula candidates

1) Good understanding of the business case

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## Advantage Brought by OntoTrans

Ontological description of the process

- > Enhances understanding of the industrial case
- > Simplifies its extension and reapplication to other cases
- > Easier management of the modelling process
- > Optimal solution for consumer centric models
- > Application cases results: 5x acceleration of the overall work process.

RANS