People Behaviour & Technology Integration

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An integrated behavioural model towards evaluating and influencing energy behaviour. The Integration of motivational factors

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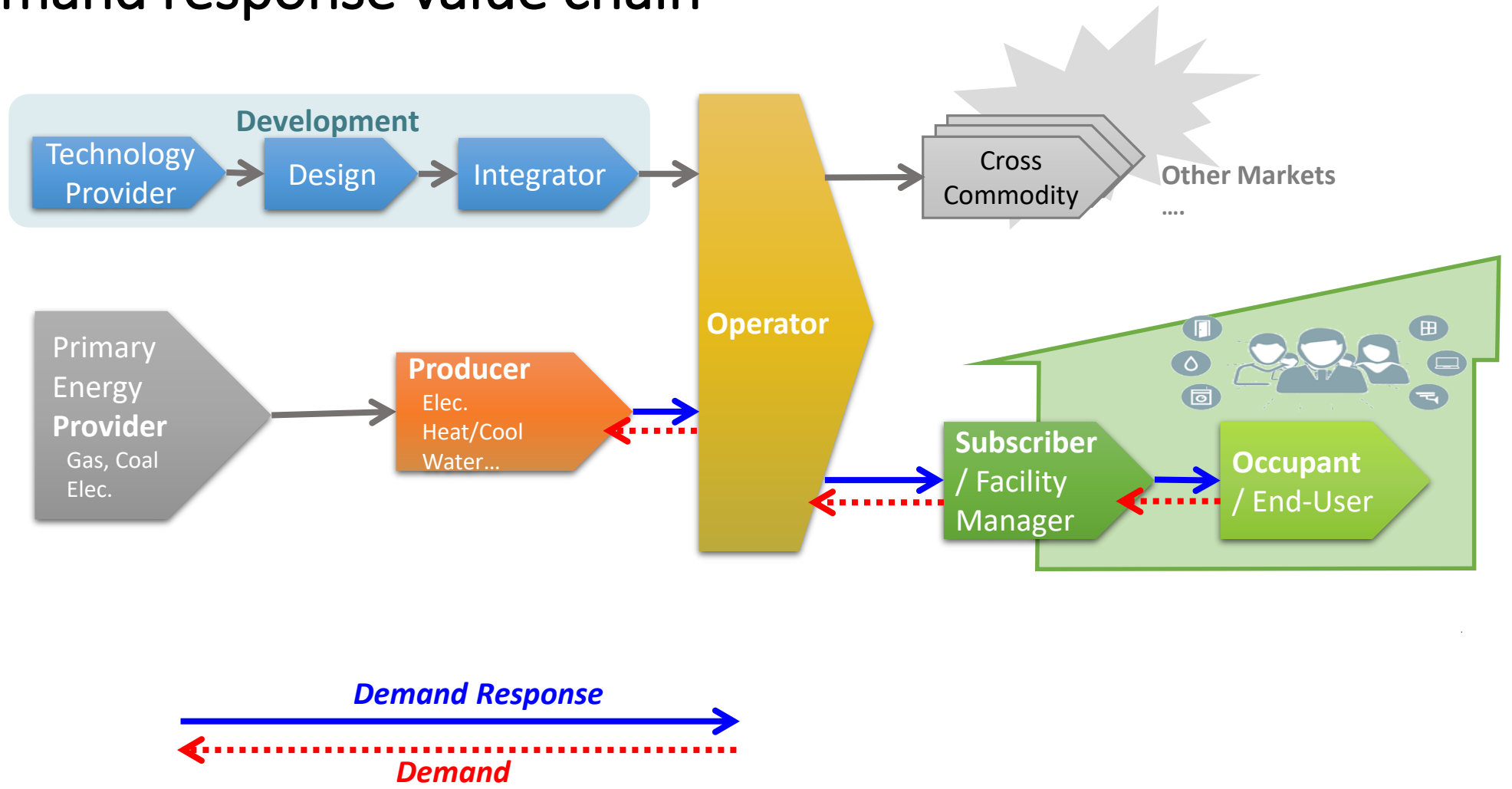
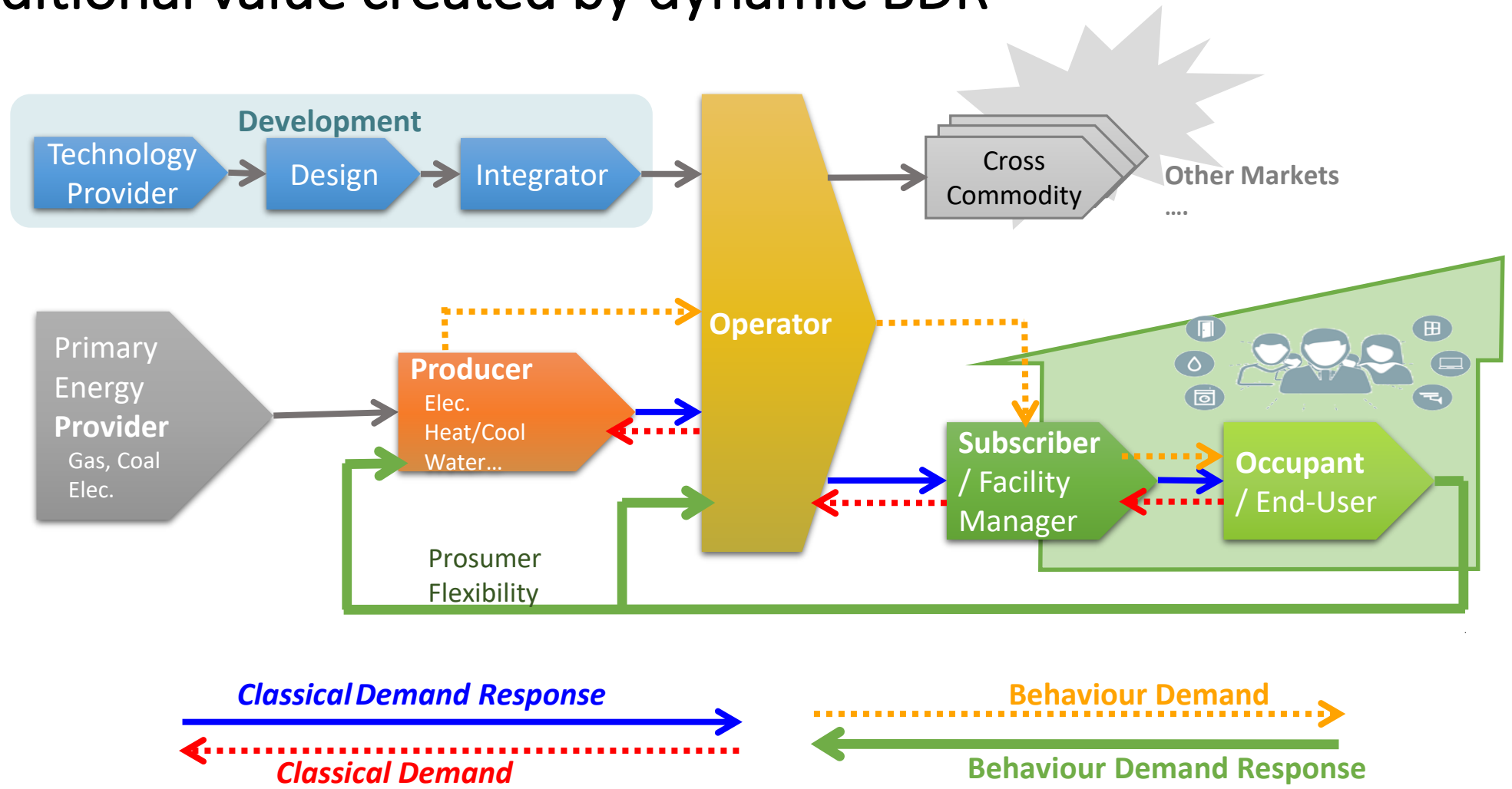
Demand response value chain



Additional value created by dynamic BDR



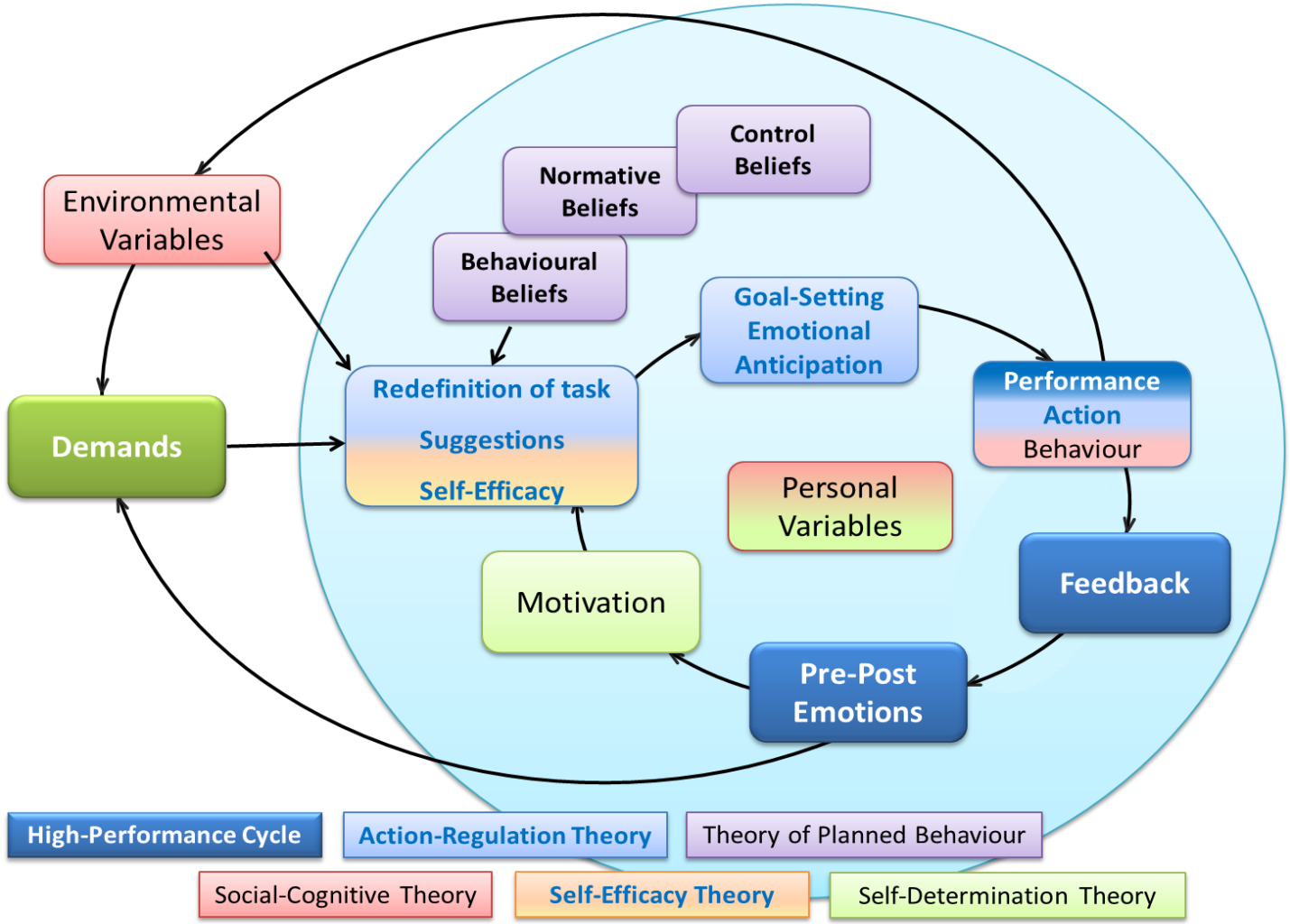
How to approach dynamic behaviour demand response?

- Awareness campaigns and smart meters?
- Incentive schemes and dynamic tariff structures?
- Send dynamic information messages to consumers?
- Create social involvement and gamification?

This is all fine, but…

- Can we approach the problem in a more structured way?
- Can we apply existing behavioural models to this problem domain?
- Can we even integrate these models into energy system optimisation?

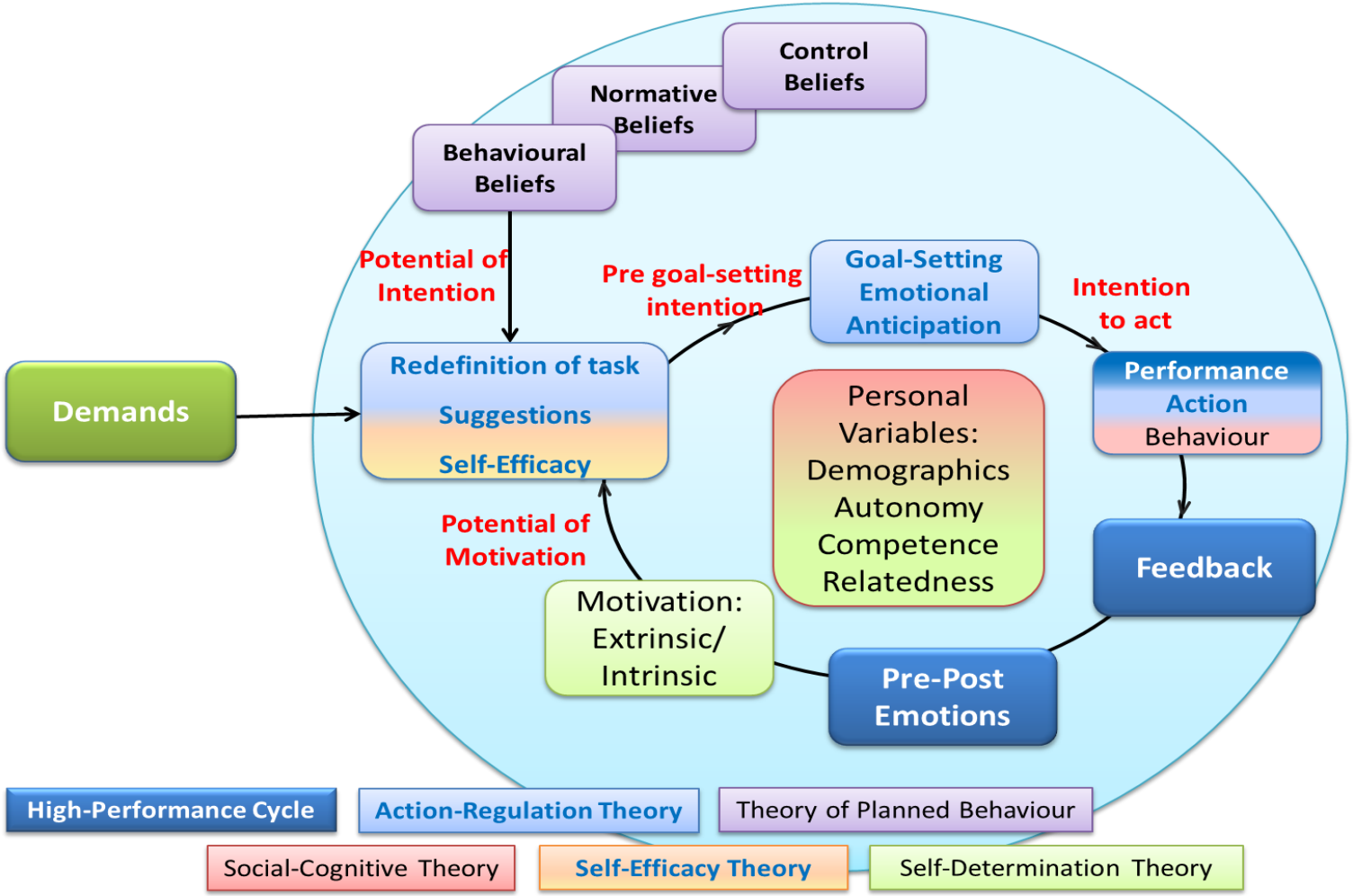
Our approach: Look at established behavioural theories



What do we get from these behavioural theories?

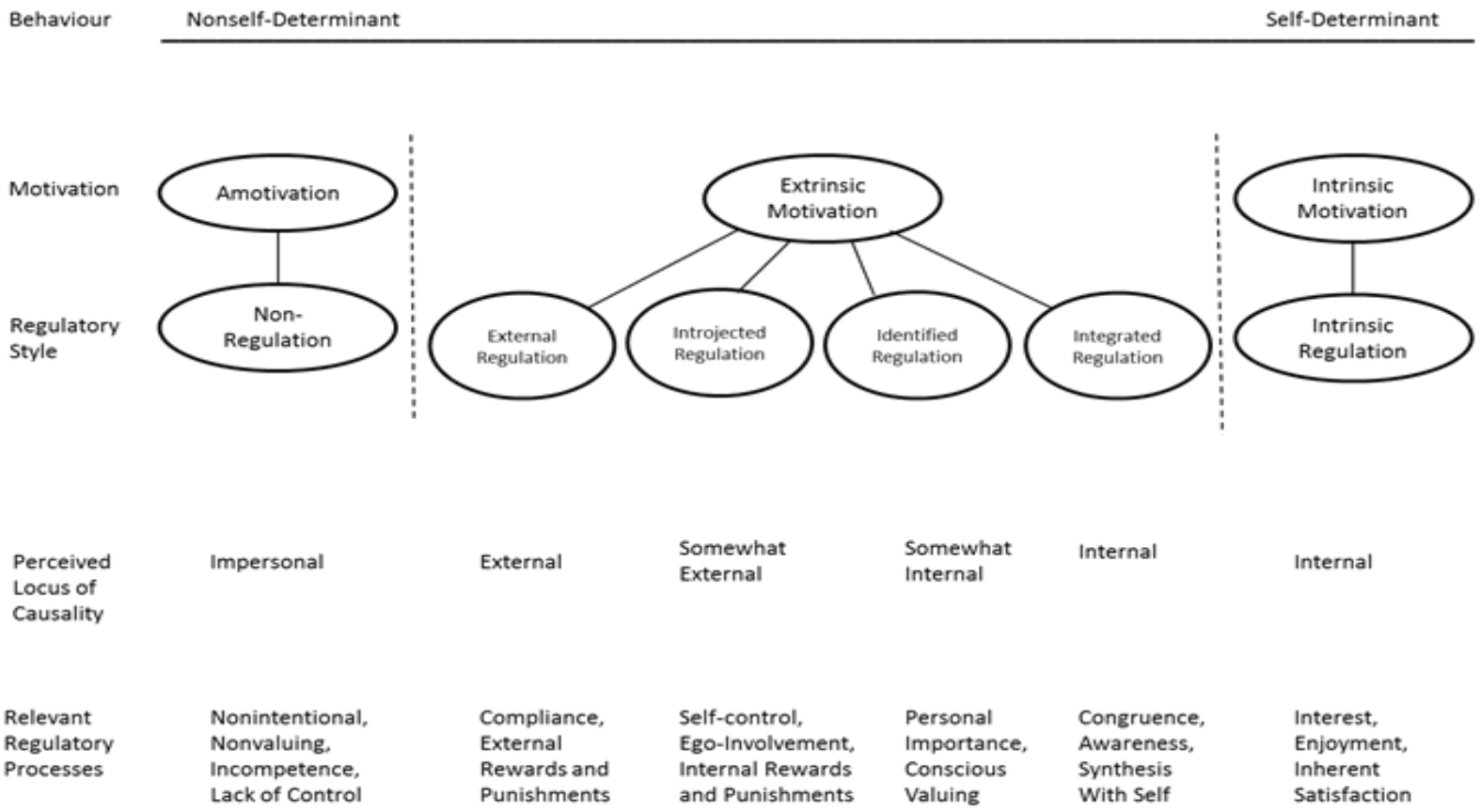
- Each theory identifies relevant behavioural variables and parameters and their mutual relations
- There is a useful body of research providing us with validated techniques for measuring behavioural variables
- This approach lends itself to Bayesian modelling, allowing to predict behavioural parameters of individuals based on fused measurements
- Model-driven estimation of behavioural parameters allows the integration of building occupants into the energy optimisation processes as reliable flexibility assets
- Model-driven interaction design aims at targeting the right person, with the right message, at the right time and location

Example: maximising the individual's *intention to act*



Example: optimising for *type of motivation*

The Self-Determination Continuum Showing Types of Motivation With Their Regulatory Styles, Loci of Causality, and Corresponding Processes



Summary and conclusion

- Behavioural modelling is a useful tool for energy optimisation
- It provides a rigorous approach based on an existing large body of research for measuring and estimating behavioural variables and parameters
- It explains many reasons why certain *ad-hoc* approaches work, but it allows to go further and integrate these techniques into a common framework
- It allows for optimisation and integration with physical asset models
- It can be used to integrate building occupants as reliable flexibility assets into the energy optimisation processes
- It can be used to optimise the interactions with energy prosumers

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Thank you for your attention.

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