

Travel Behaviour: Evolution of Conceptual Framing and Modelling Approaches

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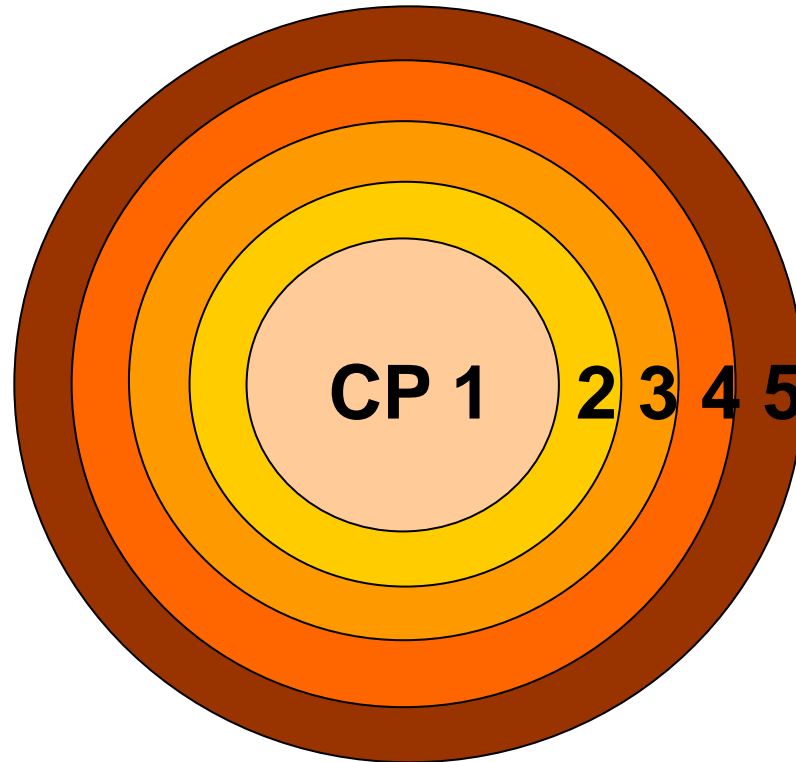
Modelling on the Move 7th December 2012

- Charting the evolving conceptual framing, or travel paradigm, over the last 60 years
- Illustrating how this has influenced policy formulation, data collection and modelling
- Incorporating impacts OF and ON transport
- Using food shopping, as a case study
- Speculate on likely future paradigm/modelling evolution

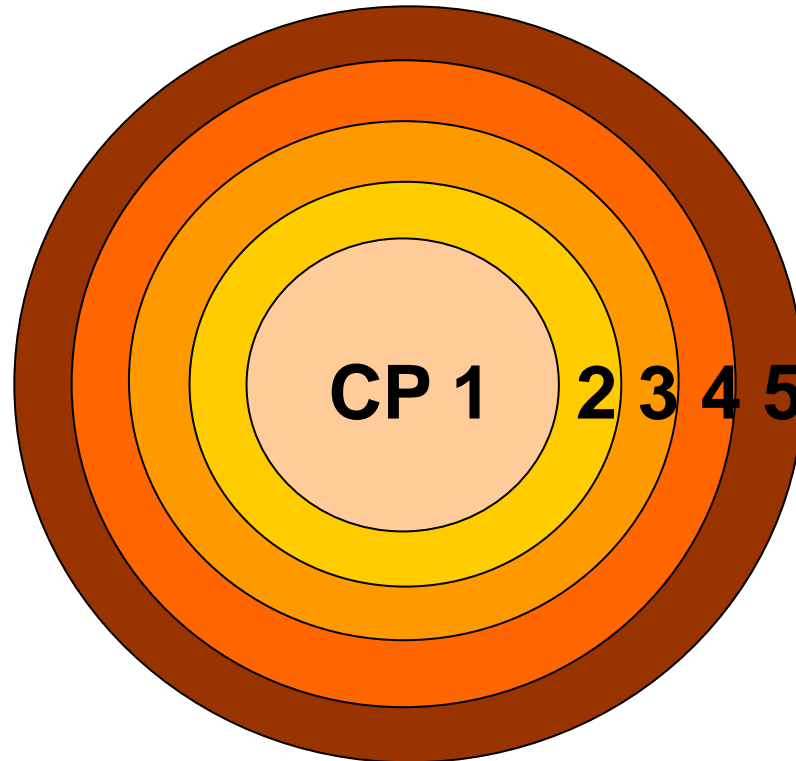
- Each discipline and profession develops and evolves its own conceptual framing, or paradigm, which shapes:
 - Issues that are perceived and described
 - Problems that are diagnosed and prioritised
 - Solutions that are generated and evaluated
- Advances often happen through paradigm ‘shifts’ (Kuhn 1962)
- Sometimes there are concurrent conflicting paradigms (e.g. medical profession)
- Influence of the paradigm is no less strong in transport – though little recognised

- Can identify a 'core' paradigm and four successive enlargements of perspective:

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Each triggered by some practical issue not resolvable using existing perspectives

CP Vehicle-based (core paradigm)

En1 Person trip-based

En2 Activity-based

En3 Attitudes-based

En4 Dynamics-based

NB: Not necessarily sequentially added



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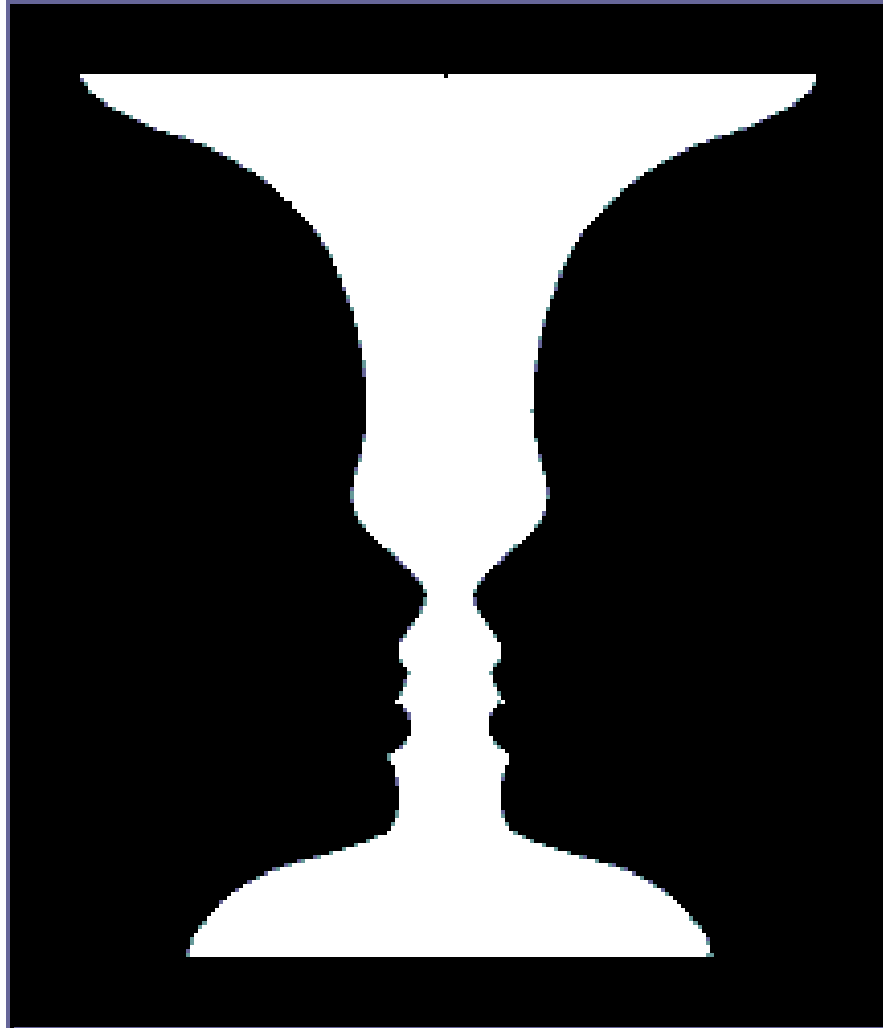
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BUT: what if cannot physically do this?

[e.g. LTS: 5X motorway capacity!!]

OR it is politically unacceptable?

[e.g. London: ‘Homes Before Roads’]



Edgar Rubin, 1915



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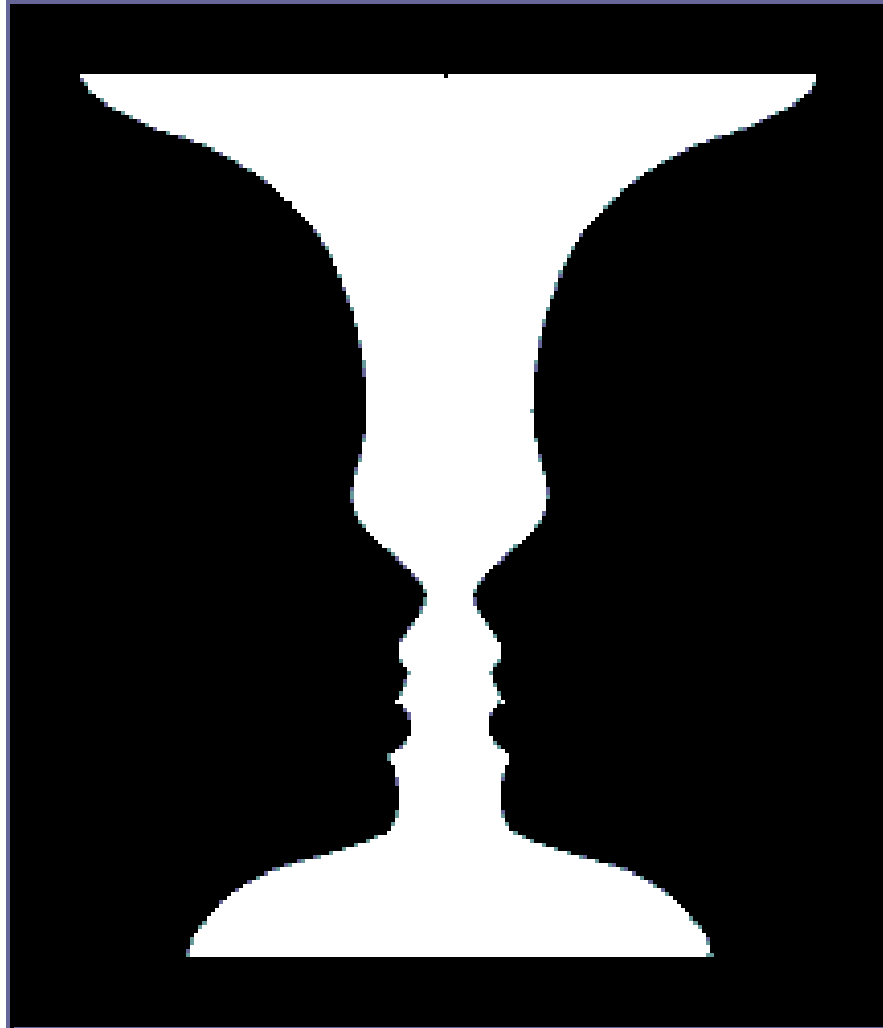
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BUT, what if still have problems?

- Modal alternatives don't meet people's needs
- Cannot forecast complexity of responses
- 'Too much travel'



Edgar Rubin, 1915



- Emphasis switches from travel to the activities that generate need for travel
- Travel now mainly a derived demand: the means of moving through space, to take part in activities at different places

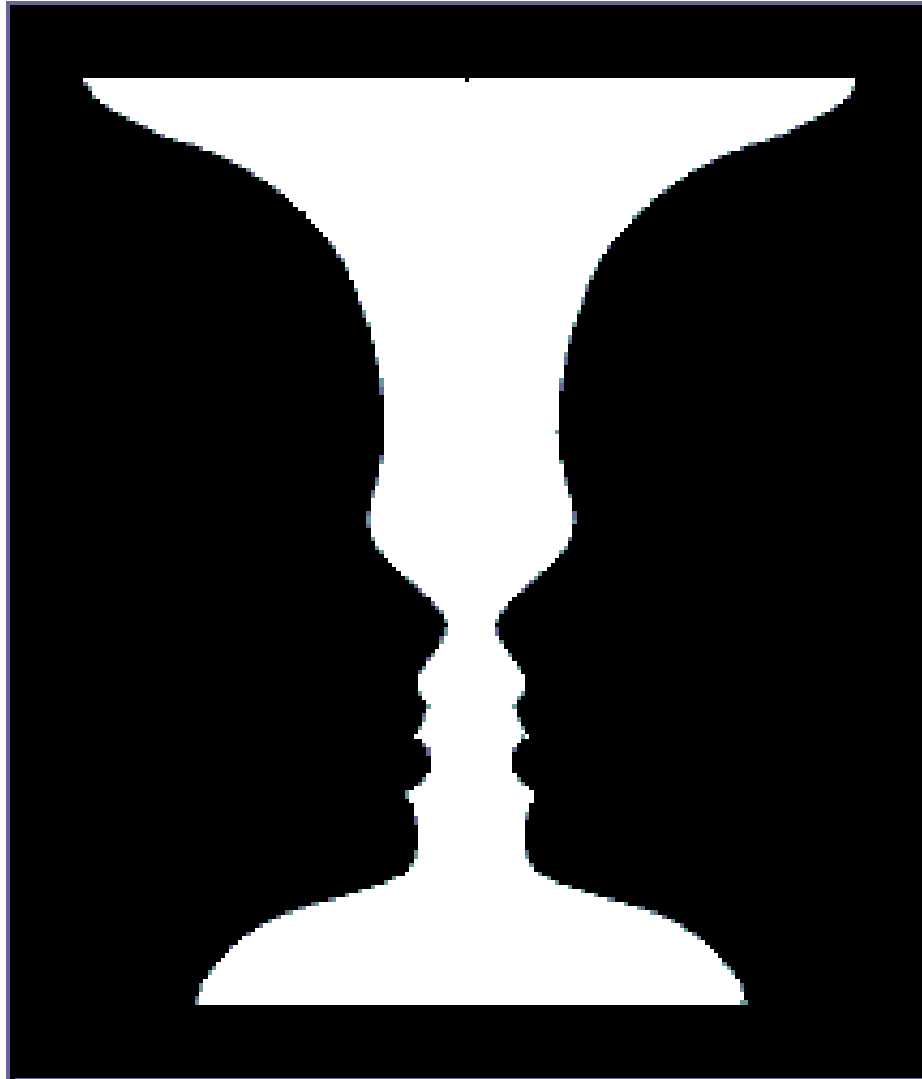


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BUT: Many factors which appear to influence behaviour are subjective not objective?



Edgar Rubin, 1915



- Recognition of importance of beliefs, attitudes and social norms in influencing behaviour
- Development of ITS forces interest in role of information
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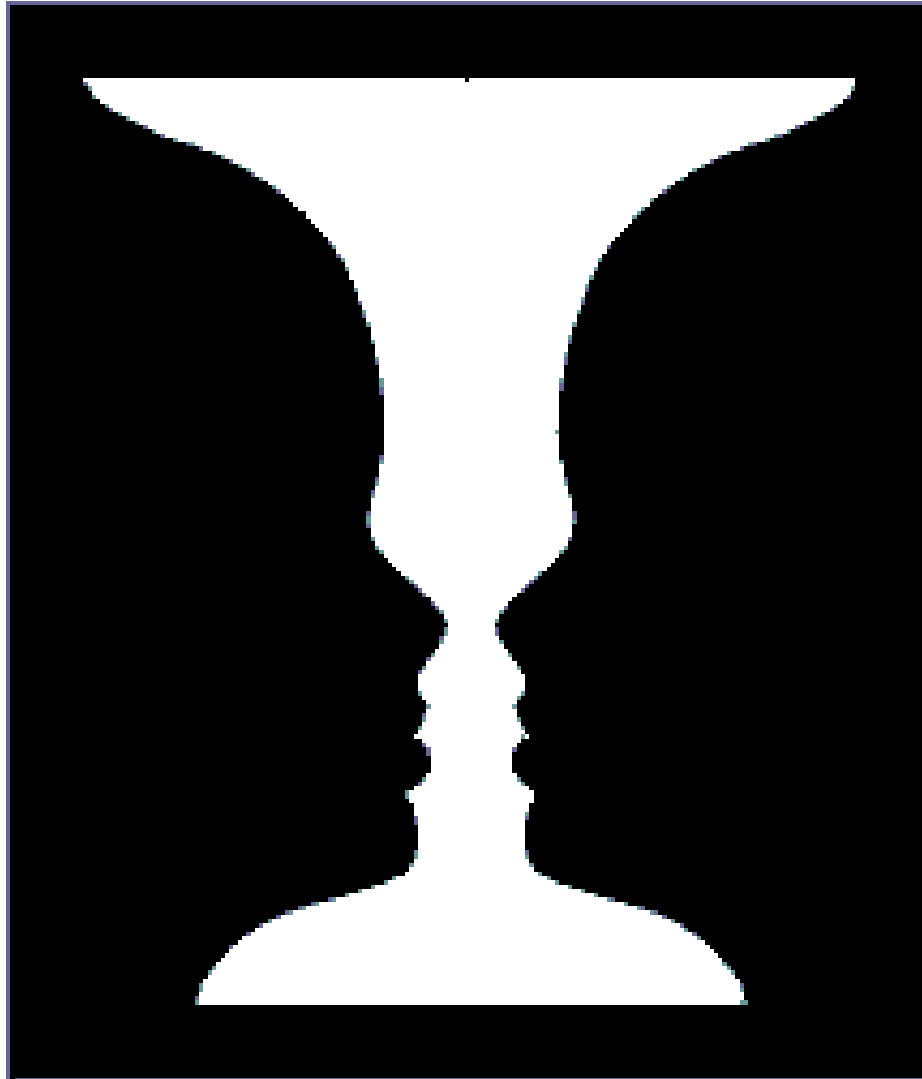


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BUT – what about leads, lags and asymmetries in behaviour?



Edgar Rubin, 1915



- Recognition that decision-making not instantaneous:
 - Lags: constraints vary in their temporal extent
 - Leads: people may make anticipatory decisions
- Importance of turnover in explaining aggregate tempo of change



- Recognition that decision-making not instantaneous:
 - Lags: constraints vary in their temporal extent
 - Leads: people may make anticipatory decisions
- Importance of turnover in explaining aggregate tempo of change
- **Recognition that policies take time to take effect**

| | | |
|------------|-------------------|------------------------------------|
| CP | Vehicle-based | Engineering |
| En1 | Person trip-based | + Economics |
| En2 | Activity-based | + Geography/planning/ sociology |
| En3 | Attitudes-based | + Psychology |
| En4 | Dynamics-based | + Finance/marketing |

How to achieve CO₂ reductions:

- **Vehicle:** more fuel efficient vehicles
- **Person trip:** switch to lower carbon modes
- **Activity:** use tele-services, or trip chain
- **Attitudes:** encourage voluntary behaviour change and eco-driving
- **Dynamics:** target interventions at decision points in people's lives, allow for build up over time

- Until recently, urban road design rooted in vehicle-based core paradigm
- Priority given to vehicle movements, through a range of measures
- Lack of incorporation of later strategic transport planning perspectives:
 - Person trips: recognise non-motorised modes
 - Activities: ‘Place’ function of streets
 - Attitudes: quality of street environment

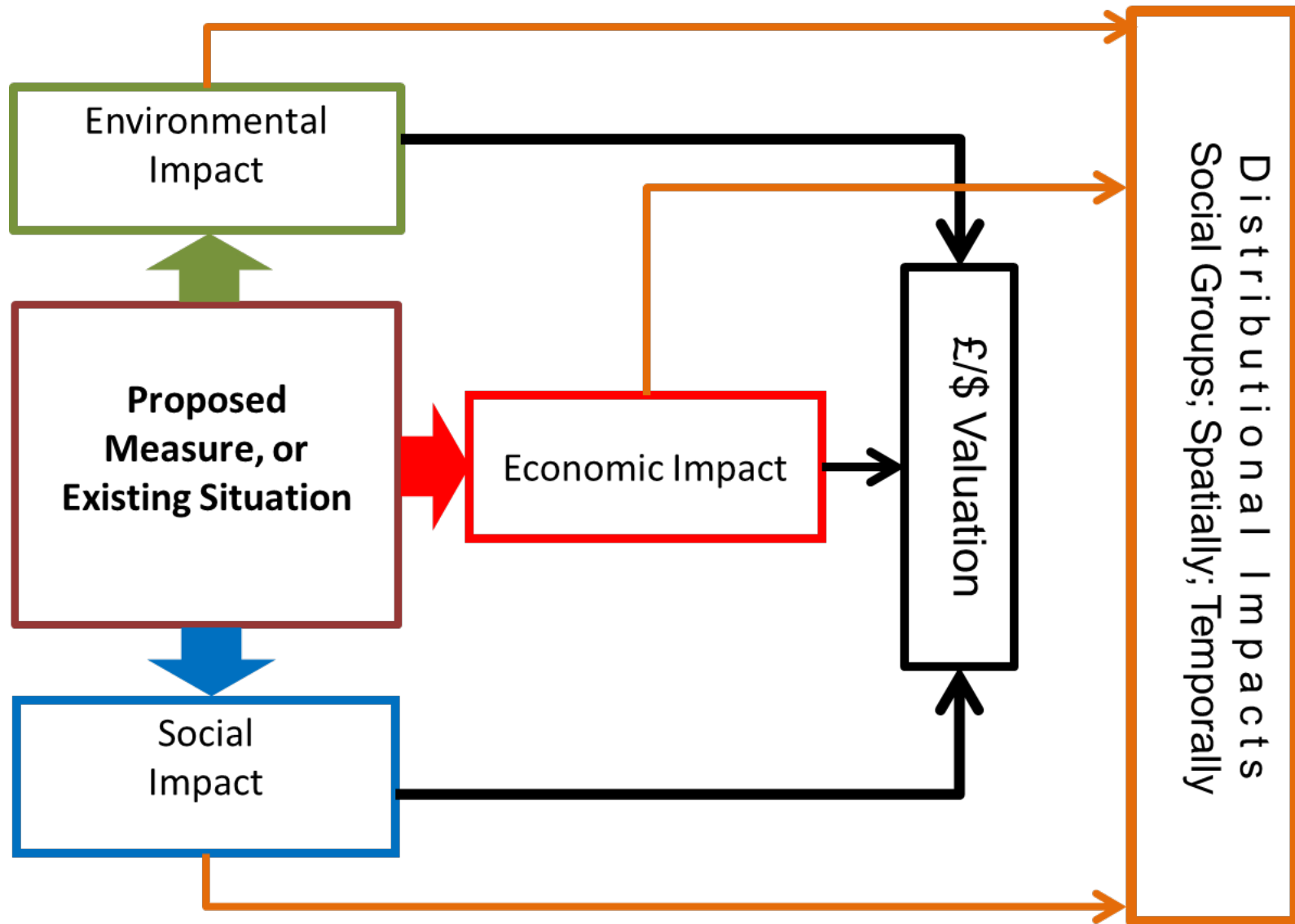
- Vehicles
- Trips
- Activities
- Attitudes
- Dynamics
- Roadside counts and surveys
- Household travel diaries – GPS tracking
- Activity diaries & time use surveys
- Attitude surveys
- Panel surveys & long duration diaries

| Paradigm expansion | Vehicle trip based | Person trip based | Activity based | Attitude based | Dynamics based |
|---|--|--|--|---|---|
| Widely used modelling capabilities | <ul style="list-style-type: none"> • Vehicle ownership/use forecasting • O-D zonal movements • Traffic route assignment | <ul style="list-style-type: none"> • Trip purposes & generation • Mode choice (generalised cost) • Disaggregate modelling | <ul style="list-style-type: none"> • Time of day switching • Tour generation?? | <ul style="list-style-type: none"> • Attitudinal modelling | <ul style="list-style-type: none"> • Short vs. long-run elasticities |
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| Limited modelling capabilities or applications | — | — | <ul style="list-style-type: none"> • Activity set generation • Activity pattern scheduling • Modelling inter-personal linkages | <ul style="list-style-type: none"> • Modelling impacts of information provision or image enhancement | <ul style="list-style-type: none"> • Dynamic model estimation • Path dependency • Asymmetrical responses |

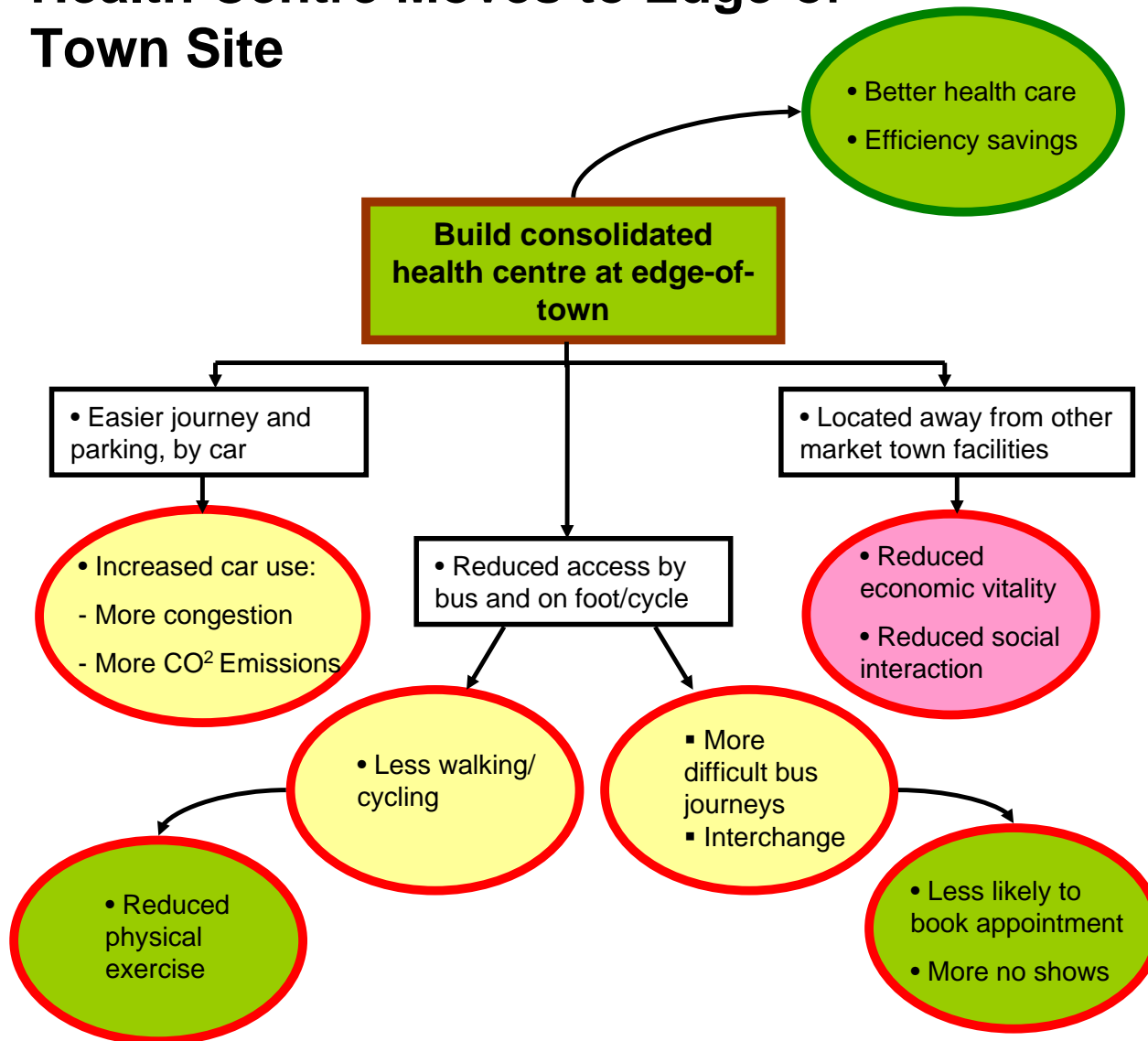
Increasing recognition that:

- Transport has a range of +ve and –ve non-transport impacts, and
- Non-transport sectors have major impacts on transport – through evolution of socio-technical systems

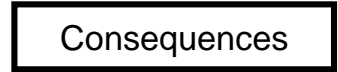


| Affected Travel Behaviour | Non-transport influences |
|--|---|
| Trip frequency | Business policies and social practices Scope for telecommunication substitution |
| Trip length | Business policies (e.g. dispersed or concentrated provision) Land use patterns (density, mixed use or zoning, etc) |
| Mode choice | Land use patterns Street network patterns |
| Vehicle type (CO ₂ emissions) | Taxation and charging policies Sources of electricity generation |

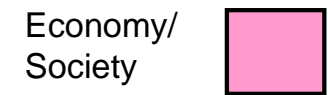
Health Centre Moves to Edge-of-Town Site



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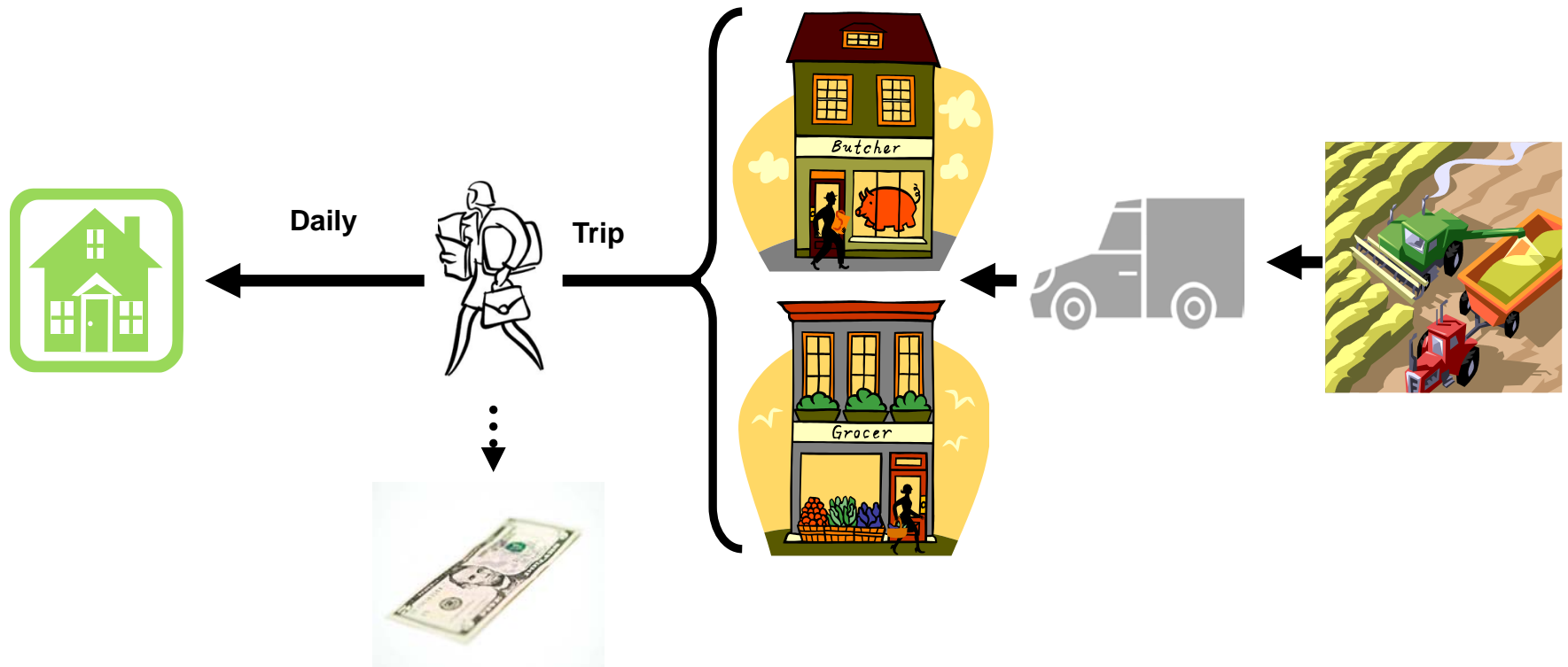


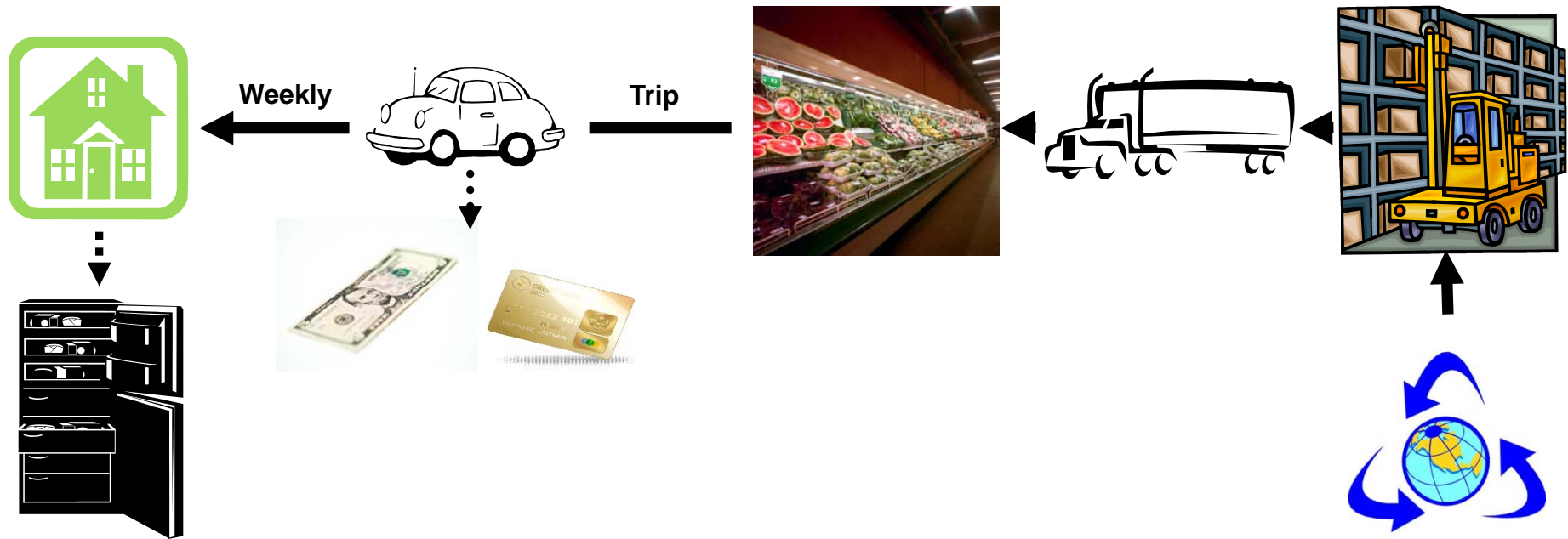
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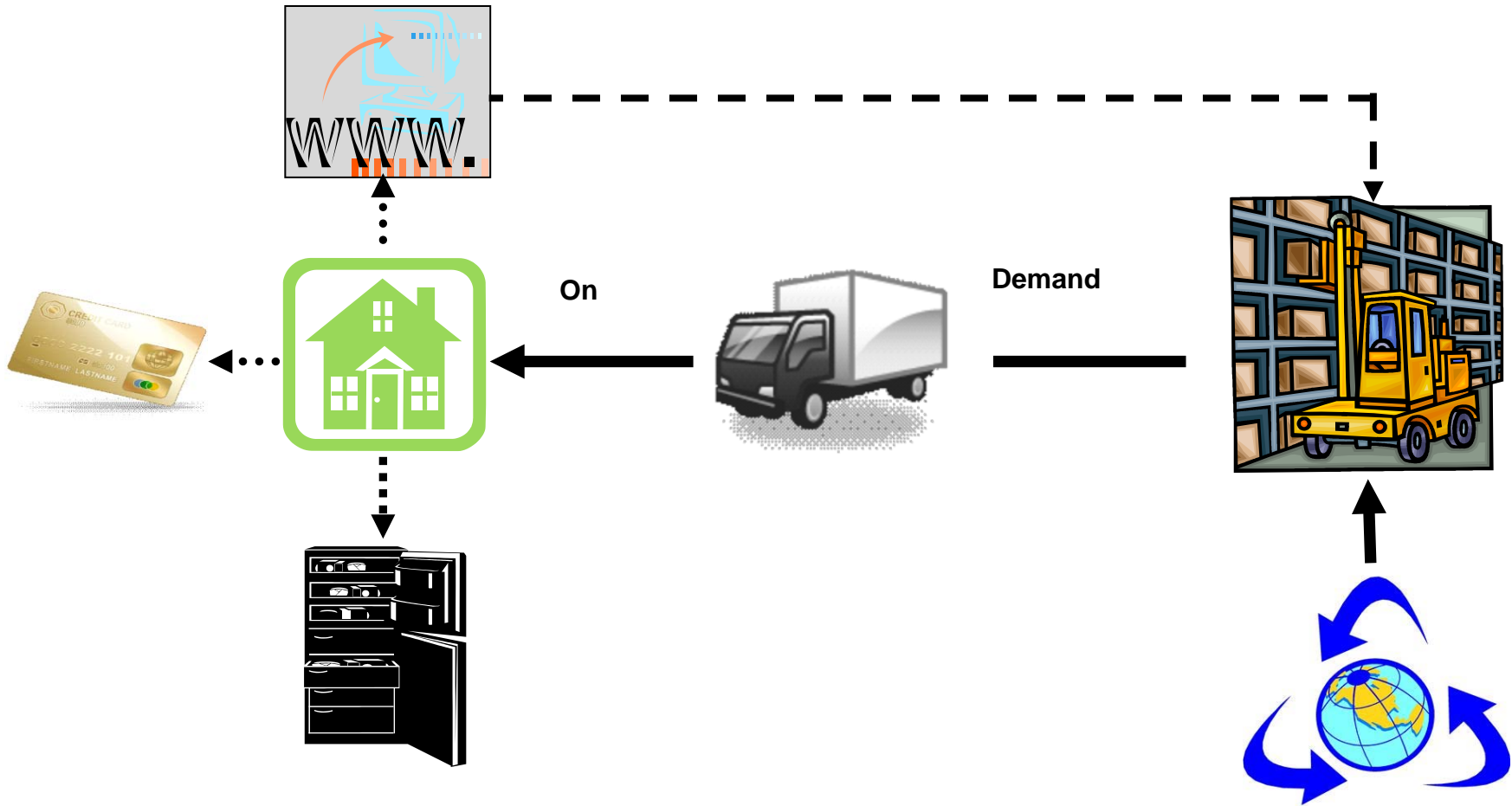


- Transport behaviour embedded in a wider socio-technical context
- Major changes in behaviour often arise from simultaneous changes in social/business practices and technologies in several sectors

The example of retail shopping patterns.....







Comparison of Three STCs

| | Building construction | Shop type/location | Grocery logistics | Home food storage | Grocery ordering | Grocery delivery pattern |
|------------------|------------------------------|-----------------------------------|--------------------------|------------------------------------|-------------------------------|---|
| STC One | Brick and wood | Small, many, within built up area | Mainly locally sourced | Limited – cool room or marble slab | In person, paying cash | <i>Daily collection on foot</i> |
| STC Two | Steel frame and cladding | Large, few, often out of town | Globally sourced | Fridge freezer | In person, using cash or card | <i>Weekly collection by car</i> |
| STC Three | Not used | Not used | Globally sourced | Fridge freezer | By internet, using card | <i>Deliveries direct to home</i> |

- Transport academics and profession influenced by an evolving paradigm
- As working environment has changed, so need for paradigm enlargements
- But with a restraining historical legacy – especially methodologically - with vehicle-based perspective remaining at the core
- Further enlargements underway: e.g. work on social networks, ‘mobilities’ & travel patterns

- BUT what might a ‘revolutionary’ approach (a paradigm shift) rather than ‘evolutionary’ approach have led to?
 - Broader emphasis on movement, telecommunications and accessibility
 - More focus on activities, lifestyles and subjective quality factors
 - A stronger social science interest, with links to the economy and society
 - Explicit treatment of cross sector impacts

Thank you!

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