Demand Side Policies for Innovation. State of the Art

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Workshop: Demand Side Policies and Public Procurement for Innovation

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Structure

1. Demand and Innovation
2. Definition of Demand Side Innovation Policy
3. Policy Trends
4. Rationales for Demand Side Innovation Policy
5. Instruments and examples
6. Challenges
7. Some illustration of evidence
8. Conclusion
1. The meaning of demand for innovation

- Efficient diffusion of innovation more important than being lead innovator for development and growth (Freeman 1994)
- Demand for innovation: **signal to market** to acquire new product / service on the basis of a need for a certain price
- **Early users**: signal, demonstration, further improvements
- Users as **source of innovation** (co-production, lead users etc., )
- **Supplier Firms**:
  - Demand conditions: **main hindrance** to innovation
  - Proximity to demanding consumers makes innovation activity more likely (true for subsidiaries of MNC!): spill overs
- **Adopting firms**: broad and fast adoption key to development
Different ways in which demand spurs innovation

- **Demand triggering innovation**: asking for new products/services (new functions, more efficient…)
- **Demand being responsive to existing innovation**: absorbing, adopting, using, accepting innovations

**Innovation role of users**
- **User produced** innovation,
- **Co-production** user – producer
- **Co-adaptation** user – producer
1. The meaning of demand for innovation

Academic models change over time

- The history of the demand model of innovation (Godin/Lane 2012)
  - 1960s: US studies (Hindsight, others): how to get more out of science: importance of “needs” for innovation asked for by state
  - Schmookler: economic factors, not mainly science (“wants” (needs or demands) and knowledge)
  - Need (demand) pull and technology push, Manchester (started Carter/Williams 1950s; Langrish et al early 1970s) / SPRU (Rothwell, “need drives innovation”, Freeman embracing Schmookler)
  - Rejected in 1980s, Mowery/Rosenberg 1979
    - Demand (expressed in market) and need (“potential demand”) conflated
    - Interplay demand – supply (e.g. Walsh 1984, Georghiou et al 1986)
    - Technological paradigms constrain demand (Dosi 1982)
1. The meaning of demand for innovation

Academic models change over time

- Rosenberg five models:
  1) technology push
  2) need pull (later labelled demand pull)
  3) coupled
  4) integrated
  5) SIN (system’s integrated and networked model)

- except for 2) demand one variable, but not starting point
- demand as *economic* category only, clearly articulated in the market place

- Need is a broader social concept,
  - Consumer: market, demand
  - Society: political process (often translated in missions)
  - “fusion” in renewed interest in the 90s, technological public procurement (landmark: Edquist / Tsipouri et al, 2000)
Demand Side IP: all public action …

"…to induce innovation and/or speed up the diffusion of innovation through

- increasing the demand for innovation,
- define new functional requirement for products and services and/or
- improve user involvement in innovation production (user-driven)

Important: many of those policies / programmes are done outside the innovation policy realm
3. Policy trends

- **As innovation policy discourse**: started 2003-2005: Kok-Report, Aho Report, EU procurement studies, UK White Paper, German High Tech Strategy…

- **Challenges** driven (innovation policy to solve future problems)

- **OECD 2011**: Concept and plenty national approaches]

- Demand based innovation policy regarded as **most important area** to learn for policy makers by Trendchart Users (July 2011)

- **Demand conditions** increasingly recognised as important as Framework Conditions for innovation systems more generally (e.g. UK studies on WFC, 2009, 2010 (WEF reports))

- Demand side policies seen – by firms – to be highly relevant (Inno-Barometer, various years)
3. Policy Trends

- 75% of EU member states have demand-side policies on their policy agendas.
- However, in concrete terms, few countries are taking further action.
- Most popular, recent areas of innovation procurement programmes are in health, transport, and environmental solutions.

Source: erawatch
4. Rationales for Demand Side Innovation Policy

- Conceptual and strategic gaps
  - **System of Innovation Approach** includes – conceptually – demand, but not role of **policy** as regards demand for innovation
  - **Innovation Policy (IP)** analysis had neglected demand side until recently (exemptions, e.g.: Edquist / Tsipouri et. al., technological procurement)
  - Development and innovation not only STI driven, but driven by **use/do/interact**: learning for and between all elements of the innovation system
  - Discussion of **role** and **justification** of demand side Innovation Policy…
4. Rationale - Three sets of justifications

**Market & system failures hamper market entry and diffusion**
- Information asymmetries (producers do not know preferences, users do not know innovations)
- Adoption externalities
- Lack of interaction between users and producers
- Lack of capabilities and willingness (switching costs) to use new technologies,
- High entry costs (high potential for network effects)
- Technological path dependencies
- Little awareness/articulation by consumers/policy

**Public sector needs**
- Making public service more effective and efficient (value for money, long term)
- Contributing to sectoral policy needs and goals (e.g. the eco-agenda)

**Support industry, growth and location**
- Support local producers, service providers
- Indirect: Triggering something bigger, market creation
  - Dominant designs, Demonstration effects
  - Scale/scope advantages
  - Learning / upgrading for buyer and provider
  - Keep up innovation pressure in system
  - Attractive investment location (demand conditions)

Intelligent public action can overcome various kinds of bottlenecks, and create and capture multiple opportunities
5. Instruments

- Public Procurement
- Price Based: Demand Subsidies, Demand tax incentives
- Awareness measures, labels, information campaigns
- Training
- Demonstration projects
- Articulation of needs, joint need definition
- Support user – producer interaction
- Support user driven innovation
- (Regulation (creating markets, security, health etc.))
- Mix of Measures
  - Various demand measures
  - Demand and supply link, pre-commercial procurement
Public Procurement of Innovation (tomorrow !)

- The purchase of a service or a good that is novel
  - to the public purchaser
  - can be new to market or new to customer
- As part of the general procurement and delivery agenda or strategically targeted (industrial policy)
  - Better public service and local need satisfaction
  - Kick off general diffusion in the system
  - Demonstration effects (other users, producers)
  - Can kick off learning and upgrading
  - Can build in and keep up innovation pressure (Asian catch up)
  - Disadvantages of classical protectionist procurement avoided (no lock in in status quo technology)
  - Cooperation between local user and suppliers
Pre-Commercial Procurement

- Pre-Commercial Procurement (link R&D and need):
  - the purchase of a R&D service (up to prototype or limited first batch)
  - Risk – reward sharing (IPR often shared)
  - Actual uptake of the innovation solution not guaranteed
    - in regular procurement
    - by private market
    - not at all
  - Various PCP types and schemes exist
    - dedicated, extra pots/schemes or
    - as part of departmental (R&D) procuring

- Direct link of supply support with demand roll out
Example I: a good demand mix

- Energy Efficiency and Innovation (Sweden)
  - 30 co-operative and catalytic Procurement Programmes at national, regional, local level (NUTEK 1990s), partly continued and adjusted by STEM:
    - Existing innovations
    - Build up of combined demand for energy efficient products (Industry and consumers)
    - Market transparency
    - life cycle approach
    - Awareness Measures (national media campaigns, labels, demonstration projects, etc.)
  - Partly supplemented with demand subsidies
  - Monitoring of the market penetration
  - STEM: user groups, articulation
Example II: Supporting user-driven innovation
The Danish Program for User-Driven Innovation 2007-10

Stimulate user-driven innovation in firms and public sector through grants.  

i) help firms to **integrate customer experiences and needs**  
ii) facilitating firms’ **access to skills and competencies** necessary to assess customer needs (internal or external capabilities)  
iii) providing firms with the means to **make accurate use of user surveys**.  
iv) Projects must examine user needs in new ways (**capabilities**)  

**Focus** on areas in which

- country has a strong business specialisation,  
- innovative solutions are needed to solve societal issues,  

**Examples**: products and services for the elderly, energy control systems  

**Challenge**: knowing user needs not sufficient for innovation, innovation from users takes time, involvement of top management in firms.

**More information**: http://www.ebst.dk/brugerdreveninnovation.dk/about
Examples: **social inclusion** by linking supply and local demand

- “Social Innovation” (ECLAC: Economic Commission for Latin America and the Caribbean): prizes to innovation involving communities that search for solutions to their own pressing needs
  

- **Criteria**
  - Innovation: new to the world **or** new to the context, adaptations
  - Cost – benefit
  - Potential for replication
  - Potential to become public policy (active upscaling)
  - Inclusion of beneficiaries
  - Societal goals: Effects on poverty reduction, inclusion, social responsibility, sustainability

- **Success:** need identification, users/beneficiaries involved (also as leaders), various sources of funding, government support, integration of production chain
6. Challenges for DSIP

I. High demand for strategic intelligence and conceptual knowledge
II. Coordination Challenge
III. Target Conflicts – dysfunctional effects
IV. Specific Public Procurement Challenges (tomorrow)
Challenges I: Strategic Intelligence

**INNOVATION PRACTICE**

**DEMAND:** Innovation Users or co-producers

<table>
<thead>
<tr>
<th>Public (users, procurers, policy makers)</th>
<th>private</th>
</tr>
</thead>
<tbody>
<tr>
<td>consumers</td>
<td>firms</td>
</tr>
</tbody>
</table>

**SUPPLY:** Innovation Producers
- State of the art
- Business infrastructure

**Framework**
- Domain policy (social need)
- Innovation/ economic
- General procurement

**Policy**

- A. Conceptual: Policy and innovation system, Rationale, Appropriateness
- B. Discursive: CTA, supplier-user discourse
- C. Operational: Market & Technology Intelligence
- D. Evaluative: ex ante / ex post – impact
Challenges II: Coordination

Co-ordination and incentive challenge:

- Innovation / economic policy with sectoral (procurement policy / regulation) – fiscal – social – education policy
- Critical mass – e.g. teaming with other cities/regions/countries
- Between state and consumers / producers

➢ Governance models? Coordination through programmes, committees, top level engagement....?
Challenges III: Potential Dysfunctionalities

- **Who benefits?** If demand satisfaction is seen as industrial policy: locus of economic benefit as a dysfunctional variable in sectoral policy approaches

- Innovation / social benefit vs. regional/local economic support (support second best to realise contract at home)

- National Champion Policy – International Firms

- Over-dependency on specialised (foreign) suppliers

  - Strong need for internal capability building
Challenges IV: Public Procurement

- Capabilities of public sector (right instruments etc.)
- Incentive structures: risks!
- Bringing risk management and real cost-benefit in the public arena
- High entry costs for innovations (public money)
- Adoption failure in public sector
- Corruption / trust
7. Illustration of evidence of demand side policy instruments effects

- Basis: Edler 2013, NESTA Study (Policy Compendium) www.innovation-policy.net/compendium/
- Secondary analysis
  - Academic: Google scholar, web of science, google
  - Policy and evaluation databases (Inno appraisal, Trendchart...)
  - Country reviews (OECD; EU)

Focus of the majority of analysis and evaluations of policy interventions on the demand side (econometric, surveys, cases)

Economic and econometric analyses (e.g. Peters et al 2012, Walz et al. 2011, Mowery/Rosenberg 1979, Freeman 1984)

Demand Policy → Innovation uptake / diffusion → Innovation generation activity → Societal benefits

Few "complete" analyses and evaluations of policy interventions on the demand side
## Price based instruments

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Subsidies</td>
<td>De facto reduced purchase price: Cash grants, cash back, cash equivalent credits, points and vouchers, fixed price</td>
</tr>
<tr>
<td></td>
<td>Less financing burden over time (plus risk reduction): loan guarantees, preferential loans</td>
</tr>
<tr>
<td></td>
<td>Guaranteed benefit from purchase (plus risk reduction): feed-in-tariffs</td>
</tr>
<tr>
<td>Tax incentives</td>
<td>Reduced purchasing price: Tax waivers of various sorts</td>
</tr>
<tr>
<td></td>
<td>Reduced tax burden over time: Tax relief/rebate, tax credits, tax deduction, tax deferrals, accelerated depreciation allowance</td>
</tr>
</tbody>
</table>
Effects - Price based instruments

- **Mixed messages** – no clear „best“ approach
- Subsidies for eco-innovation purchase:
  - Diffusion and size of markets push innovation
  - Positive impact of subsidies on uptake, but often not „significant“
    - E.g. 15% price reduction (insulation): „limited“ effect (8% to 11% of respondents)
    - Other factors often more important (cost savings over time, other input factors)
    - Considerable windfall
- Cross country studies: differences in instrument designs, problematic for comparability (but no systematic analyses)
Effects – Price based instruments

- Comparison supply vs. demand side:
  - Limited evidence, often wrong indicator (patents only)
  - R&D subsidies more important for R&D leading to patents; product innovation,
  - Demand subsidies: process (diffusion effect)
  - Older studies: (public) demand more important than R&D subsidies
  - R&D subsidies confined to domestic players, demand measures also push innovation abroad
    • Dependent on need for user – producer proximity

- Price based measures vs. command and control:
  - Contradictory results, but: c&c more important for radical innovation
Price based instruments – Design principles

- Subsidy effect: Immediate monetary effect more important than savings over time (or raising costs of old technology over time)
- Demand measures risk of creating lock in (developing niche, but no incentive for next generation)
- Right level of incentive:
  - too high: inefficient, too low: no sustained diffusion
- Timing
  - Leverage effect on diffusion higher in early phase (but risk: too early)
  - Reduction over time reasonable
Ambivalent effects
- Awareness, security increases diffusion: diffusion – innovation effects
- Transparency through labels increases competition and innovation
- Innovation active firms more responsive to labels (less innovative firms: regulations)

but
- labels status quo oriented, innovation not rewarded

Private schemes less effective than public schemes

Design
- Simplicity and clear message (cost saving)
- Linking labels with financial means (cheaper loans)
Evidence - Conclusions

- Policy gap: triggering; user produced, user – producer
- Broad evidence gaps:
  - Knock on effects on innovation, on producers
  - Effects of subsidies hard to isolate
- Effects complementary, other factors often more important
- Price based more effective than C&C, but not for radical innovation
- Design:
  - Potential dysfunctional effects: timing (in two ways)
  - Right level of support? Right level of share in target group?
  - Simplicity
- Innovation policy thinking into domain policies
- International coordination, Europe
- Sophisticated strategic intelligence needed
8. Overall Conclusions

- Legitimacy of STI system depends on capability to solve problems
- Demand oriented policy can improve
  - translation of need into innovation (articulation, political process)
  - social inclusion in innovation
- Strategic integration of innovation into all public policy
  - Shift of innovation responsibility into domain policies
  - Combination of sectoral /social policy aims and innovation
  - Linking of instrumentation
8. Overall Conclusions

- Horizontal and vertical coordination / strong leadership

- Broader understanding of strategic intelligence
  - Build up of expertise within public policy-making
  - Three levels: conceptual / technological/market, CTA

- Implementation challenges

- Keeping in mind the matching supply side/infrastructure
Further information and contact

www.innovation-policy.net/compendium/

Report number 12 in particular

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Annex
## A Typology of demand side measures

<table>
<thead>
<tr>
<th>Instrument</th>
<th>State Role</th>
<th>Method of Functioning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Public demand</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General procurement</td>
<td>Buy and use</td>
<td>State actors consider innovation in general procurement as main criterion (e.g. definition of needs, not products, in tenders)</td>
</tr>
<tr>
<td>Strategic procurement (technology-specific)</td>
<td>Buy and use</td>
<td>State actors specifically demand an <em>already existing</em> innovation in order to accelerate the market introduction and particularly the diffusion. State actors stimulate deliberately the <em>development</em> and market introduction of innovations by formulating new, demanding needs.</td>
</tr>
<tr>
<td>Co-operative procurement</td>
<td>Buy / use moderation</td>
<td>State actors are <em>part of a group of demanders</em> and organises the co-ordination of the procurement and the specification of needs. Special form: <em>catalytic</em> procurement: the state does not utilise the innovation itself, but organises only the private procurement</td>
</tr>
</tbody>
</table>
## A Typology of demand side measures

### 2. Support for private demand

#### Direct support for private demand

<table>
<thead>
<tr>
<th>Demand subsidies</th>
<th>Co-financing</th>
<th>The purchase of innovative technologies by private or industrial demanders is directly subsidised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax incentives</td>
<td>Co-financing</td>
<td>Amortisation possibilities for certain innovative technologies</td>
</tr>
</tbody>
</table>
## A Typology of demand side measures

### 2. Support for private demand

**Indirect support for private demand: information and enabling (soft steering)**

**State mobilises, informs, connects**

<table>
<thead>
<tr>
<th>Awareness building measures</th>
<th>State actors start information campaigns, advertises new solutions, conducts demonstration projects (or supports them) and tries to create confidence in certain innovations (in the general public, opinion leaders, certain target groups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labels or inform. campaigns</td>
<td>The state supports a co-ordinated private marketing activity which signals performance and safety features.</td>
</tr>
<tr>
<td>Training and further education</td>
<td>Consumers are made aware of innovative possibilities and simultaneously placed in a position to use them.</td>
</tr>
<tr>
<td>Articulation</td>
<td>Societal groups, potential consumers are given voice in the market place, signals as to future preferences (and fears) are articulated and signalled to the marketplace.</td>
</tr>
<tr>
<td>User – producer interaction</td>
<td>State supports firms to include user needs in innovation activity or organises fora of targeted discurs (innovation platforms)</td>
</tr>
</tbody>
</table>
A Typology of demand side measures

<table>
<thead>
<tr>
<th>Regulation of demand or of the interface demander – producer (steering via standardisation)</th>
<th>Regulation of product performance and manufacturing</th>
<th>Regulation of product information</th>
</tr>
</thead>
<tbody>
<tr>
<td>The state sets norms for the production and introduction of innovations (e.g. market approval, recycling requirements). Thus demanders know reliably what certain products perform and how they are manufactured. Smart regulation to leave freedom to choose technologies, but changing the incentive structures for those choices (e.g. quota systems)</td>
<td>Regulating, (economic incentives and &quot;command and control&quot;)</td>
<td>The state creates legal security by setting up clear rules on the use of innovations (e.g. electronic signatures)</td>
</tr>
<tr>
<td>Usage norms</td>
<td>The state stimulates self-regulation (norms, standards) of firms and supports / moderates this process and plays a role as catalyst by using standards</td>
<td>Support of innovation-friendly private regulation activities</td>
</tr>
<tr>
<td>Standards to create a market</td>
<td>State action creates markets for the consequences of the use of technologies (emission trading) or sets market conditions which intensify the demand for innovations</td>
<td>Moderating, organising</td>
</tr>
</tbody>
</table>
## A Typology of demand side measures

### Systemic Approaches

<table>
<thead>
<tr>
<th>Integrated demand measures</th>
<th>Strategically co-ordinated measures which combine various demand-side instruments</th>
</tr>
</thead>
</table>

### Integration of demand- and supply-side measures

| | Combination of supply-side instruments (R&D programmes) and demand-side impulses for selected technologies or services. Conditional supporting of user-producer interaction (R&D grants if user involved) Specific Instrument: Pre-commercial Procurement |
# Marker for understanding demand conditions

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Marker for</th>
<th>Explanation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyer sophistication: ability of buyers to understand innovation and utilise it</td>
<td>Responsive demand, public and private</td>
<td>For the introduction and diffusion of innovation the ability of buyers to understand the added benefit and to replace existing products is key. Countries/regions with high sophistications are better placed to test, launch (and often produce (?)) products</td>
<td>WEF</td>
</tr>
<tr>
<td>Attitudes of private end consumers and firms towards novelties (risk/cost vs. reward perceptions)</td>
<td>Responsive demand, private</td>
<td>Consumer confidence index (private consumers only, not organisations): Composite indicator - attitude towards innovation and intention to buy and use innovation</td>
<td>Le vie 2009</td>
</tr>
<tr>
<td>Uncertain demand for innovative goods or services, high important factor of hampering innovation activities</td>
<td>Responsive Demand</td>
<td>Firms report their expectations as to how responsive demand is to their innovations.</td>
<td>Community Innovation Survey</td>
</tr>
<tr>
<td>Ability of companies to absorb new technology ((1 = not able to absorb new technology, 7 = aggressive in absorbing new technology)</td>
<td>Responsive demand, private</td>
<td>Indicator for firm demand for innovation</td>
<td>World Economic Forum Report</td>
</tr>
<tr>
<td>Government procurement of advanced technology products</td>
<td>Responsive demand, public</td>
<td>Indicator for inclination of public purchasers to buy innovative technologies</td>
<td>World Economic Forum Report</td>
</tr>
</tbody>
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## Marker for understanding demand conditions

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</tr>
</thead>
<tbody>
<tr>
<td>Value of public procurement which is openly advertised as a percentage of GDP</td>
<td>Responsive demand, public</td>
<td>The indicator shows the relative importance (size) of public procurement (% of GDP) and indicates which of the procurement is open to European Competition, there is a likelihood that those tenders attract more innovative firms.</td>
<td>EUROSTAT</td>
</tr>
<tr>
<td>Share of innovative companies cooperating with customers</td>
<td>Triggering demand</td>
<td>Indicate the relative importance of customers (there is no distinction between public and private) as cooperation partners and thus.</td>
<td>CIS (CIS 5 question)</td>
</tr>
<tr>
<td>Attitude towards risk from new technologies: „If a new technology poses a risk that is not fully understood, the development of this technology should be stopped even if it offers clear benefits: disagree</td>
<td>Responsive demand</td>
<td>Inclination of consumers to absorb innovation early.</td>
<td>Eurobarometer 224, QA12a.1</td>
</tr>
<tr>
<td>Attitude towards scientific discovery: Interest in new scientific discoveries and technological developments</td>
<td>Responsive demand</td>
<td>Inclination of consumers to absorb latest technology based on scientific development.</td>
<td>Eurobarometer 340-QC1.3</td>
</tr>
<tr>
<td>Expenses on technology intensive products / share of consumer spending</td>
<td>Responsive demand</td>
<td>This indicates how much consumers spend on products that have a higher technology intensity and thus a higher likelihood of being technology innovative.</td>
<td>OECD</td>
</tr>
<tr>
<td>Growth rate on expenditure for mobile and ITC equipment</td>
<td>Responsive demand</td>
<td>This indicates the dynamic of market demand for innovation intensive products in ICT sector.</td>
<td>OECD</td>
</tr>
</tbody>
</table>
Further challenges in public procurement: various risks within public administrations

- Policy maker in the relevant sectoral department(s):
  - risk of failure to deliver service, initial costs

- Innovation Policy makers:
  - Who benefits (economic spill over to other countries)

- Specialised public procurer:
  - risk of having to invest a more expensive solution with no rewards for better service, capability

- Finance ministries, actors responsible for budgets:
  - costs, failure to appreciate benefits

- Internal, administrative end users:
  - risk of failure to learn and adapt or to manage new interface with end beneficiaries, risk of being made redundant

- Supplier: Market risk – spill over to broader, private market?
1) **Conceptual**: What is the failure, what are the demand conditions

- Demand condition analysis (systems mapping: missing links? Diffusion analysis, adoption surveys (supply and demand side), focus groups...)

- User driven innovation: mapping, scaling potential
Challenges I: Strategic Intelligence

2) Discursive: support in identifying, defining, shaping demand
   ➢ Foster **demand articulation and bundling**

- **Private demand:** To understand / influence
  - Long term user preferences, societal goals
  - User **awareness / capabilities**, transaction costs, risk
  ➢ To enhance **responsiveness:** constructive technology assessment, user-driven foresight, user – producer interaction

- **Public demand:**
  - often internal use not straightforward, departmental discourse, awareness building
  ➢ Basic re-thinking of public procurement needed (see below)
Challenges A: Strategic Intelligence

3) Operational intelligence on supply side
   - Technology “readiness”
   - Understanding **supplier readiness**: can they really deliver?
   - **Complementary** supply chain conditions, supporting business infrastructure, skills...
   - Technology foresight, supplier discourse

4) Expecting/Assessing impacts? Economic and societal
   - Understanding the intermediate effects and behavioural changes
   - Attribution and timing
   - Indicators?