Summary - OC940 System Innovations & Strategic Niche Management

WEEK 2 Ontology = foundational assumptions about the nature of the world/reality and its causal relations

↳ MONISM = all reality is reduced to be caused by single entity
↳ DUALISM = mind versus matter
↳ PLURALISM = not one consistant set of truths about the world

Transitions and systems innovations = about socio-technical transformations
↳ multiple ways to view and understand transitions

Multi-Level Perspective (MLP)

- Originates from understanding "technological transitions"
- Socio-technical perspective: technologies only fulfill societal functions in association with human agency

Transitions:
- Long-term (50 years)
- Multi-actor (science, policy, firms, users, etc.)
- Co-evolutionairy (mutual influences of technical and social changes)
- Multi-level (macro, meso, micro)

↳ to understand the dynamics of transitions
↳ to guide transitions into socially desirable directions

Technological regimes
- rules or 'grammer' embedded in product characteristics, procedures, ways of defining problems; all embedded in institutions and infrastructures.
- technological generate routine behavior

Socio-Technical regimes (ST-regimes)
- broader concept
- includes: users, policy makers, societal groups, etc.

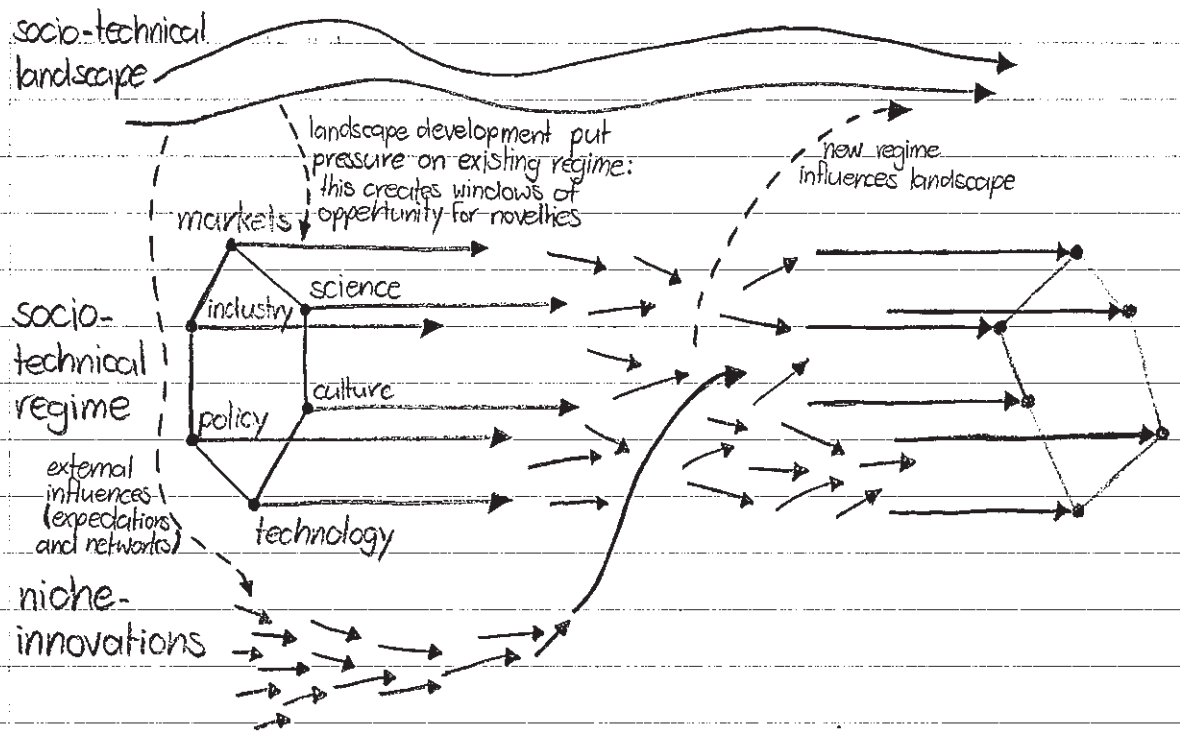
Niches

↳ "protective spaces" that nurture and incubate radical innovations ("broeden")

Socio-technical landscape

↳ deep structural trends in wider economy and society
↳ major events
↳ cannot be influenced
↳ put 'pressure' on regimes: create window of oppertunity for niche innovations

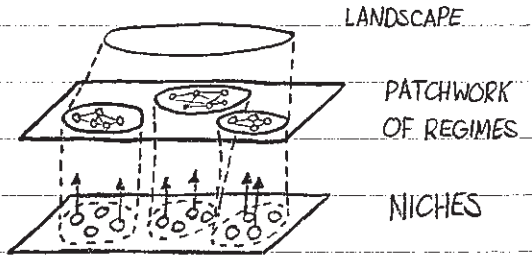
MULTI-LEVEL PERSPECTIVE ON TRANSITIONS



Transitions happen when:

- there is sufficient pressure from the landscape
- socio-technical regimes are instable and open for change
- niche innovations are available and are sufficiently developed

MULTIPLE LEVELS AS A NESTED HIERARCHY



Strategic Niche Management (SNM)

Focus → Radical innovations
↳ Early introduction phase of innovations in society

Main question → How and under what circumstances is the succesful emergence of a niche possible?

Protective space

↳ Function of protection: - shielding (against regime selection pressures)
- nurturing (improving the innovation)
- empowering (press for wider institutional change)

↳ 'Passive' spaces: e.g. geographical distinct areas, environmentally concerned groups

↳ 'Active' spaces: e.g. subsidies (policy), incubator programs (strategic firm)
↳ Couveuse (Broedmachine)

'Socio-technical experiments' as entry point for niche creation and development → e.g.: demonstration projects, pilot projects, community initiatives, etc.

↳ thes experiments should be designed to:
- establish and strengthen new networks
- provoke actors to articulate and negotiate their expectations
- stimulate a good learning process

Local SNM analysis

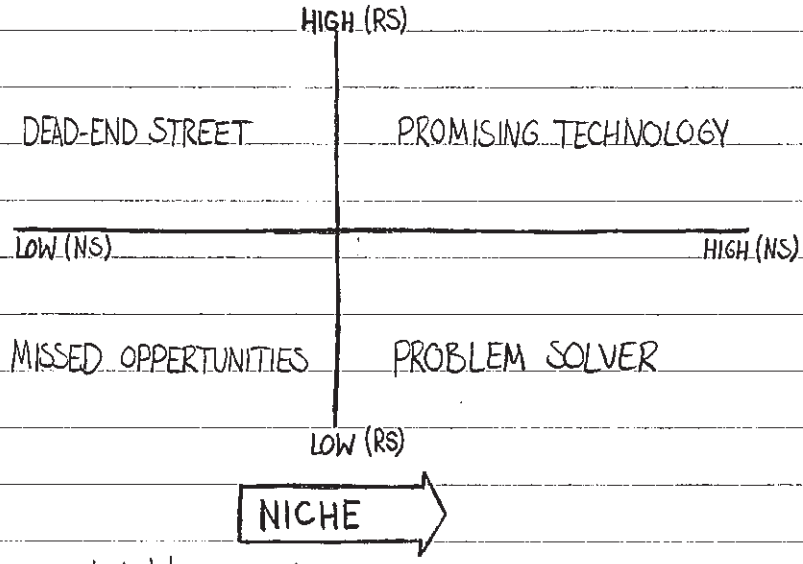
- Unit of analysis: experimental project
- Focus on: network of actors involved in a project; actor expectations; actor learning goals; contributions to niche development; external (regime and landscape) triggers and barriers.

→ NOT WORLD-WIDE

Global SNM analysis

- Unit of analysis: an emerging 'field' around sustainable techology
- Focus on: field networks; field-expectations and field-learning processes; emerging regime; interactions between experimental projects; interactions with incumbent regime.
↳ zittende/huidige

Integrated niche-regime perspective



Niche stability
REGIME
→ vision and expectations
→ learning
→ network formation

RS = REGIME STABILITY
NS = NICHE STABILITY

Regime stability → internal tensions
→ internal policies (changes in the socio-technical landscape)

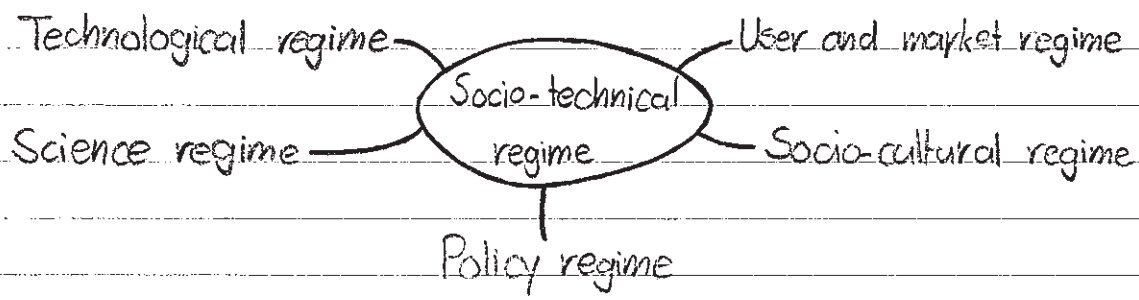
Co-firing bio-energy in the Netherlands (Raven, 2006)

↳ to understand trajectories of emerging sustainable innovations
↳ experiments → energy from waste
↳ problems: - no clear regulatory rules for co-firing (new rules needed)
- normative rules & societal resistance

WEEK 3

Actor networks

- Innovation and transitions: social processes
- Engineers, managers, policy users, users, etc.: routine-driven
  - ↳ Routines are embedded in: technologies, infrastructures, institutions, organisational networks, etc. (ST-regime)
  - ↳ Routines in multiple groups are aligned



'Broad/heterogenous networks' → niches as spaces were actors from variation and selection environments collaborate in experimental socio-technical projects

'Regime outsiders' → actors who do not share (all of the) core rules of the existing socio-technical regime; actors with diverging (more sustainable) visions on the future of the regime.

Outsiders (resources)
1. Industrial firms (financial and managerial resources, engineering competence)
2. Engineering and scientific proffesionals (engineering and scientific knowledge)
3. Social pressure groups (possibility to mobilize public opinion/other actors)

↳ today 'outsider involvement' is mainstream (citizen panels, focus groups, etc.)
↳ outsider challenges: - outsiders become insiders
- outsiders are not taken seriously (decision making)
- issues of representativeness

Expectations

- Background: sociology of expectations
- Expectations considered key element in development of new technologies

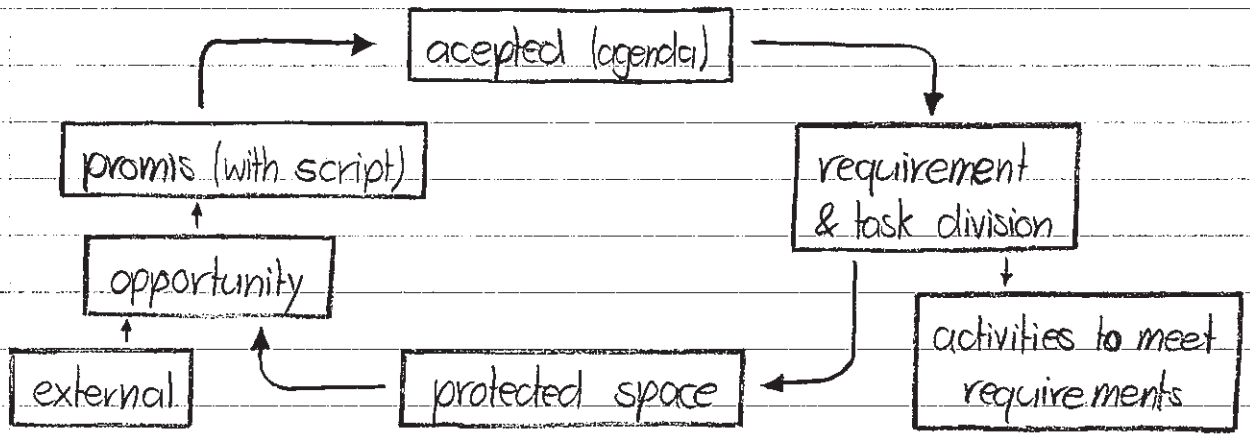
- Assumption: socio-technical experiments can positively contribute to broader regime changes, if:
  - they result in shared expectations
  - they result in higher quality of expectations
  - they make expectations more specific

Expectation dynamics at different levels (Van Lente, 1993)
* Micro-expectations: statements that contain specifications for an innovation
* Meso-expectations: statements that express functions that a technology will fulfill
* Macro-expectations: statements that refer to broader societal trends and scenarios

What actors do with expectations:
- Legitimize (justify) their arguments
- Mobilize funds, attention of other actors
- Reduce uncertainty, allow decision making

• Expectations are 'performative' → they 'do' things with actors

PROMISE-REQUIREMENT CONVERSION (Van Lente, 1993)



Learning

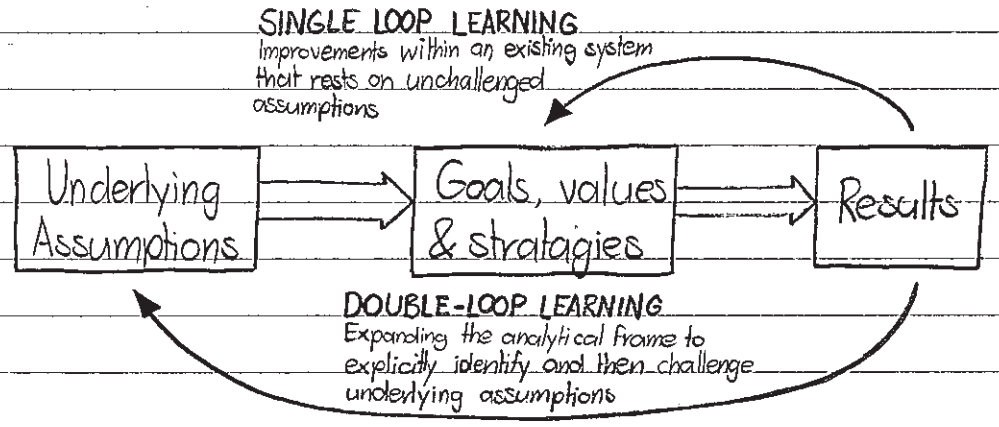
• Importance of learning: individual, organisational, sectorial
• SNM focused on: * 'practice-based' learning
* interactive learning (experimental projects in real-life)
• Importance of 'reflexive' or second-order learning (questioning core assumptions)

Different types of learning (Kemp, 2004)

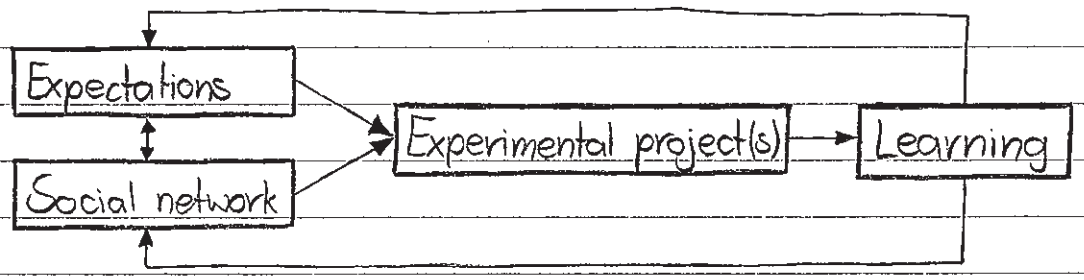
1. 'Learning by searching'
   ↳ R&D, universities, research institutes, research department
2. 'Learning by doing'
   ↳ optimalization during manufacturing stage, learning process within firms
3. 'Learning by using'
   ↳ furter optimalization as result of use, firms learn from users (feedback)
4. 'Learning by interacting'
   ↳ learning in (emerging) innovation systems, includes variety of actors

Learning on multiple dimensions
- technological development and infrastructures
- economic performance
- industrial development
- government policy and regulatory framework
- development of user context
- societal and environmental impact
↳ importance of multi-dimensional learning and alignment between the technical and the social

Second-order learning (double-loop learning)
↳ learning about underlying assumptions and values
↳ contrast with 'first-order learning' (learning within clear problem definitions)



RELATIONSHIP BETWEEN NICHE-PROCESSES



Projects (Biogas in Juhnde and Västerås → sheets)
↳ Initial vision
↳ Local networking and negotiating expectations
↳ Social learning and wider interaction

Strategic Niche Management

↳ Niches develop as the result of complex relationships between expectations, networking and learning in and across socio-technical experiments
- broad social networks (including outsiders)
- shared and specific expectations
- second-order learning on multiple dimensions

↳ Niches develop in interaction with broader regime and landscape processes, which provide both barriers and opportunities

WEEK 5

Transition management

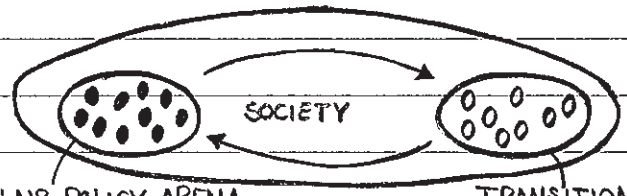
Transitions are a fundamental change of structure, culture and practices in a societal (sub)system
- Culture: collective set of values, norms, perspectives, paradigms
- Structure: physical infrastructure, economic infrastructure, institutions, rules, ...
- Practices: behaviour, operation, implementation

Transitions are not: manageable, makeable, engineerable or predictable.

Transition governance principles

- Long term thinking as the basis for short term policy
- Thinking in terms of: * multiple domains (MULTI-DOMAIN)
  * different actors (MULTI-ACTOR)
  * different levels (MULTI-LEVEL)
- Learning as an important aim for policy (learning by doing)
- Orient governance towards system innovation besides system improvement
- Keeping options open; exploring multiple pathways
- Selective participation focusing on frontrunners

TRANSITION ARENAS



REGULAIR POLICY ARENA
- short term
- peloton
- incremental change
- problem and goal oriented

TRANSITION ARENA
- long term
- frontrunners
- system-innovation
- problem and goal searching

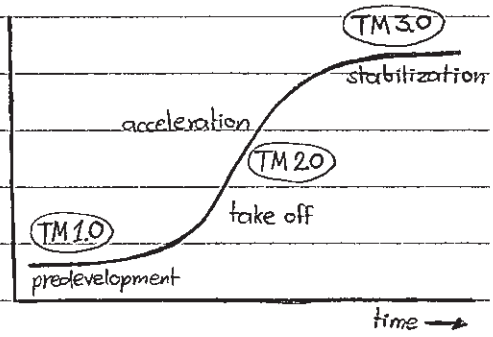
Transition Management (TM)

- Builds on complex system theory; governance; socio-technical transitions; sociology; economics and psychology.
- Is not social engineering but social construction.
- Provides a set of tools for social innovation.
- A theory experimentally developed in practice

TM 1.0
- → Creating space and convergence
- → Arenas, experiments
- → Discourse and culture

TM 2.0
- → Focus on broadening
- → Arenas of arenas
- → Innovation portfolio
- → Strategic agendas

TM 3.0
- → Focus on breakthroughs
- → Institutions for transition
- → New standards
- → Upscaling and structural change



WEEK 6

Innovation Systems thinking (IS)

↳ Network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.

↳ All parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring.

↳ A set of institutions whose interactions determine the innovative performance of national firms.

National Innovation Systems (NIS or NSI)

- Different strands of innovation systems research
- NIS:
  * focus on understanding the innovative economic performance of nations
  * static/comparative analysis between nations
  * important role for national government and public policies in influencing an innovation system
  * national government as one actor among many (firms, financial organizations, knowledge institutes, users)

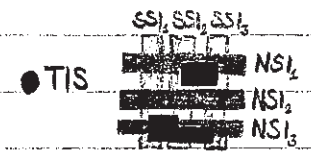
Regional Innovation Systems (RIS)

- Focus on regional clusters of innovative activity
- 'Innovation in region-specific' (Silicon Valley; Eindhoven Brainport)
- Important role for regional historical institutions (Philps → Eindhoven)
- Geographical proximity is instrumental in interaction and collaboration.
- Importance of specialized local labor force

Sectorial Innovation Systems (SIS or SSI)

- Processes and components of innovation are 'sector-specific'.
- Encompasses both structural components and processes.
- Attention for dynamics and transformation of systems through co-evolution.

Technological Innovation Systems (TIS)

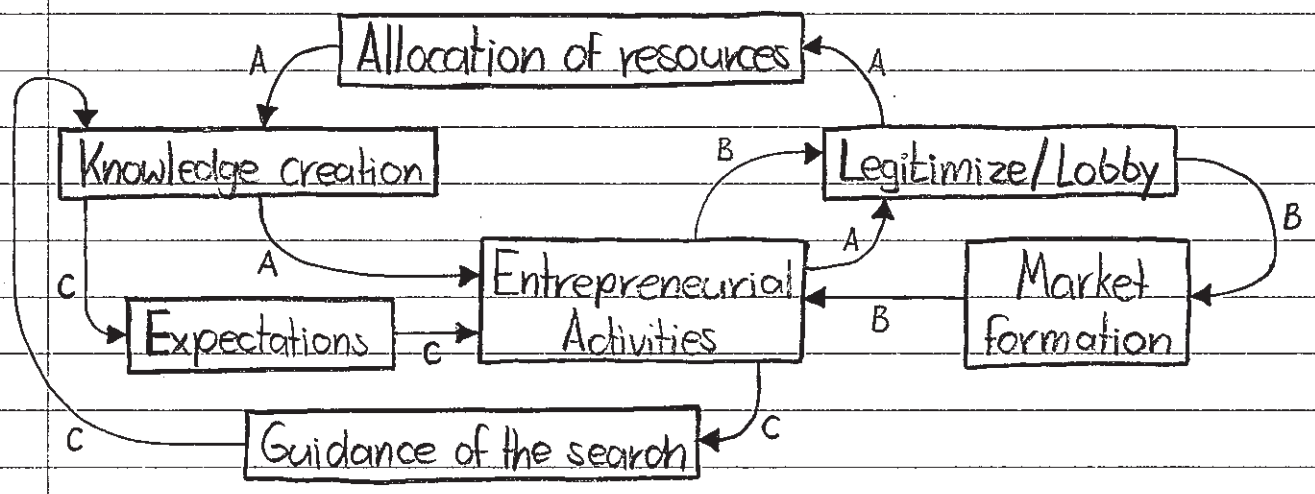


- Innovation system around specific technology
- TIS can be cross-sectoral and/or cross (or sub-)national

Functions and indicators (activities)

F1 → Entrepreneurial activities (translate knowledge into business opportunities/innovation)
F2 → Knowledge development (learning activities on emerging technology, markets, networks...)
F3 → Knowledge diffusion (diffusion of knowledge through learning by interacting)
F4 → Guidance of search (activities that shape needs, requirements and expectations of actors)
F5 → Market formation (creation of a demand for the emerging technology)
F6 → Resource mobilization (allocation of financial, material and human capital)
F7 → Support from advocacy coalitions (counteract resistance in the incumbent system)

MOTORS OF CHANGE (3 TYPES → A, B and C)



4 types of 'Motors of change'
- Science and technologie push motor
- Entrepreneurial motor
- System building motor
- Market motor

TIS versus SNM/MLP

- Many simularities → focus on experimentation, expectations, network and learning
  → also visable in policy recomandations
- TIS strengths
  - more elaborate than SNM (beyond experimentation in single niches)
  - better conceptualization of strategy making & entrepreneurial action.
  - differentiation between structures and processes
- TIS weaknesses
  - limitation to quantification
  - no strong conceptualization of context: no theory of TIS-RIS-NIS interactions
  - not clear on how to make choices between multiple TIS
- Additional system failure: directionality failure, demand articulation failure, policy coordination failure, reflexivity failure.
- Differences in models of actors: TIS → actors are fulfilling system functions
  MLP/SNM → routine drive actors (sense making)

WEEK 7 # Actor Network Theory (ANT)

- Not a tool to explain or govern transitions
- A deep, fundamental critique on mainstream sociology

- Background mainstream sociology and ANT
  ↳ Mainstream sociology: the class someone belongs to 'predicts/explanes' a certain career perspective
  ↳ ANT: how does 'class' emerge from actors networking from each other? how do these actors talk about class, if at all?

- In ANT, 'the social' consists of 'a network of associations between hetrogeneous elements'. This is called an 'actor-network'. (AN)
- AN features:
  - they are in 'continuous flux' (processes of re-making, re-configuration,...)
  - boundaries/groups are not static
  - they are made up of people and things (have ability to reconfigure, resist,...)
  - controversies in AN are signals of re-assembling

- Key concept: sociological translation
  ↳ The process through which actors try to realize their 'actor-worlds', their preferred realities.

- Four moments of translation:
  1. Problematization: Framing of problems by a primairy actor intended to realise an AN in such a way that they become 'indespensable' → controverse to be expected!
  2. Interessement: A primairy actor undertakes action to interest other actors in their actor world → actors may challenge acts of interessement
  3. Enrolment: The outcome of succesful interessement: targeted actors accept their new position in a network with different roles
  4. Mobilization of allies: 'A test' if the enrolled actors adequately represent who they say they represent → controversies: the masses do not accept their representative

Different type of actors. Which can be used in an analysis?

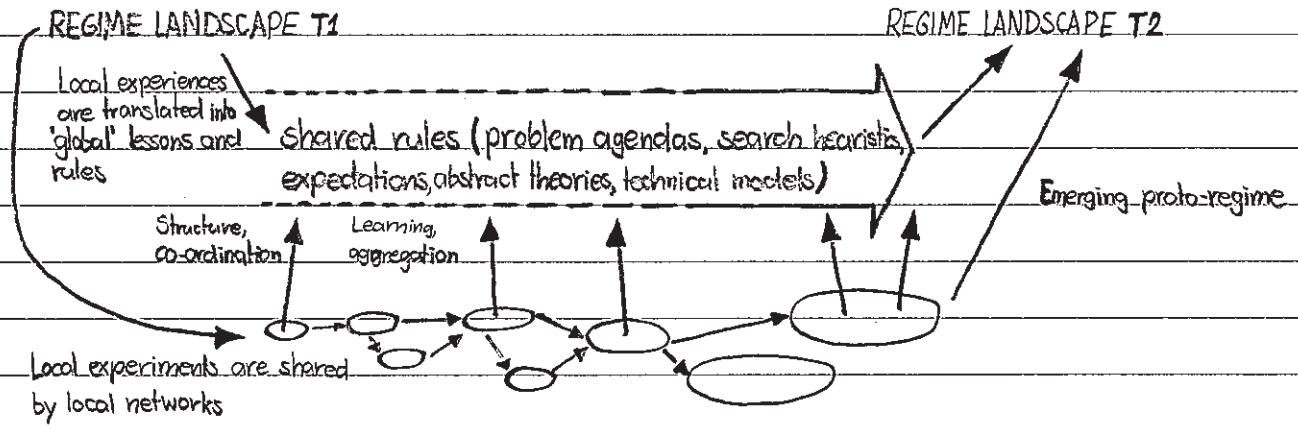
↳ Intermediaries: * transports meaning of force without transformation
* not interesting in ANT

↳ Mediators: * transform, translate, distort and modify the meaning of elements they are supposed to carry
* ANT is all about mediators

Translations between niches and regimes

- Niches are constructed in opposition to the regime
- Lessons in the niche are re-interpreted and partially integrated in the regime, and vice versa. (no fundamental restructering)
- Regimes are altered in a way that brings it closer to the niche or vice versa.

TRANSLATIONS BETWEEN GLOBAL NICHE AND LOCAL EXPERIMENTS: TRACING ARROWS (Raven)



ESTEEM

step 1: Project past & present → Problematization
step 2: Vision building
step 3: Identifying conflicting issues
step 4: Portfolio of options
} → Interessement
step 5: Shaking hands → Enrolment
step 6: Action planning → Mobilization

Actor Network Theory & Multi-Level Perspective / Strategic Niche Management

Topic of comparison	Multi-Level Perspective (MLP)	Arenas of Development (AoD)
main theoretical inspiration	socio-technical theory	actor-network theory (ANT)
transition concept	state changes from on to another	inclusive and fluid transformation processes
change dynamics	discrepancies between regimes, niches and landscapes	tensions between actor-worlds resulting in changing alignments and boundaries
core configuration	ST-regimes leading to focus on stabilisations and innovation processes	actor-worlds emphasising their frames of interpretation
role of actors	rule followers / niche builders	navigators, performing visions and socio-material practices

Main lesson from ANT

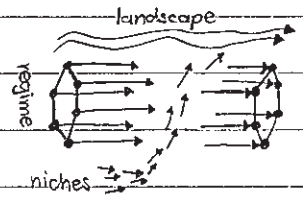
- Look at the processes/actors behind concepts such as niches, regimes, landscape
- These are not fixed objects; they are analytical constructs
- ANT has no context (in empirical studies it makes sense to have context)

Recap - OC940 System Innovations & Strategic Niche Management

WEEK 2 **Multi-Level Perspective (MLP)**

- ↳ Transitions
- ↳ Technological regimes
- ↳ Socio-Technical regimes (ST-regimes)
- ↳ Niches
- ↳ Socio-technical landscape

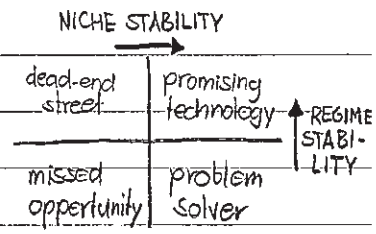
MULTI-LEVEL PERSPECTIVE ON TRANSITIONS



Strategic Niche Management (SNM)

- ↳ Protective Space (function: shielding, nurturing and empowering; active and passive)
- ↳ Socio-technical experiments
- ↳ Local and Global SNM analysis

INTEGRATED NICHE-REGIME PERSPECTIVE



WEEK 3 **Actor Networks (AN)**

- ↳ 'broad/hetrogenous networks'
- ↳ 'regime outsiders'
- ↳ Outsiders (Industrial Firms, Engineering an Scientific Proffesionals, Social Pressure Groups)

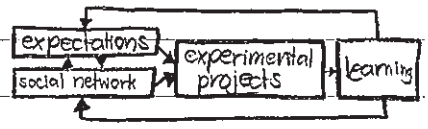
Expectations

- ↳ at different levels (MICRO, MESO, MACRO)

Learning

- ↳ types of learning (learning by; searching, doing, using and interacting)
- ↳ learning on multiple dimensions
- ↳ second-order learning (double loop)

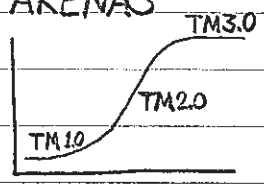
RELATIONSHIP BETWEEN NICHE-PROCESSES

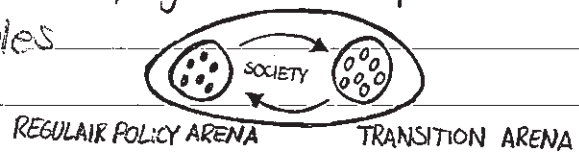


Developments of niches

WEEK 5 **Transition Management (TM)**

- ↳ Transitions are not: managable, makeable, engineerable or predictable
- ↳ Transition governance principles
- ↳ TRANSITION ARENAS
- ↳ TM 1.0
- ↳ TM 2.0
- ↳ TM 3.0





WEEK 6 **Innovation Systems thinking (IS)**

- ↳ National Innovation Systems (NIS)
- ↳ Regional Innovation Systems (RIS)
- ↳ Sectorial Innovation Systems (SIS)
- ↳ Technological Innovation Systems (TIS)
- ↳ motors of change (Science and Technology, Entrepreneurial, System building and Market)

TIS versus SNM / MLP

- ↳ simularities
- ↳ TIS strengths
- ↳ TIS weaknesses

WEEK 7 **Actor Network Theory (ANT)**

- ↳ background mainstream sociology and ANT
- ↳ ANT Features
- ↳ four moments of translation (P I E M and their controversies)
- ↳ different type of actors
- ↳ translations between niches and regimes

ESTEEM (P V I P S A)