

Grassroots innovation



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What is grassroots innovation?

[Networks of activists and community organisations generating novel bottom–up solutions for sustainable development

[Solutions that respond to the local situation and the interests and values of the communities involved

[Communities exercise control over both the process and results of innovation

[Neglected by innovation policy – which is based in combinations of technology-led, state-led, or market-led approaches

Examples

[Car clubs

[Wind turbines

[Refrigeration (*zeer pots*)

[Mobile laundering

[Community currencies

[Solar home systems

[Repair Cafés

[Cycle rickshaw gear-trains

[Eco-housing neighbourhoods

[Rainwater harvesting

[Urban agro-ecology

[Hackerspaces and Makerspaces

[Etc etc etc ...

- **Artefacts** (e.g. specific artefacts, such as water-cooled fridges, or portable milling machines)
- **Methodologies** (e.g. participatory design, regional network-building, entrepreneurship)
- **Actors and alliances** (e.g. new identities & subjectivities, grassroots entrepreneurs, innovation scouts, tech developers)
- **Infrastructure and facilities** (e.g. prototyping workshops, design expertise, databases)
- **Networks** (e.g. topics like agro-ecology or housing, mentoring programmes, development services, representation, knowledge platforms, skill swapping)
- **Concepts and agendas** (e.g. for knowledge production, whether commons-based or proprietary, for ways of being and organising, relationships with people and resources)

The movement for socially useful production

- Workers at Lucas Aerospace in 1970s, like others, confronting restructuring, new technology, and unemployment
- In opening design, prototyping and production to popular participation sought to build, reinforce and extend right to socially useful production
- Provides a practical underpinning to alternative innovation framing:
 - Arms conversion, alternative technology
 - Industrial democracy & community participation
 - Human-centred, skill enhancing new technology
- Unusual & uneasy alliances: peace, community activism, environmentalists, new left, feminism – originating from skilled, craft-based workers at Lucas Aerospace
- Links with Scandinavian work on technology & unions



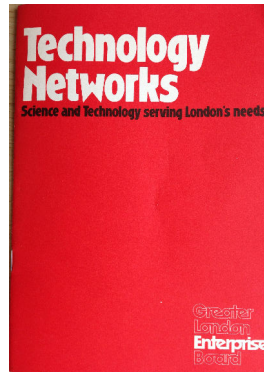
In London in 1982 ...

- Socialist GLC's Greater London Enterprise Board (GLEB)
 - Co-operative enterprises, industrial democracy and socially useful production
 - Rescuing manufacturing decline and jobs
- Five Technology Networks: community-based workshops
- Combining “untapped skill, creativity and sheer enthusiasm” in local communities with the “reservoir of scientific and innovation knowledge” in London's polytechnics:
 - LIN: London Innovation Network
 - LNTN: London New Technology Network
 - LEEN: London Energy & Employment Network
 - Thames Technet
 - LTTN: London Transport Technology Network
- Linked to movement on left for socially useful production



In the Technology Networks ...

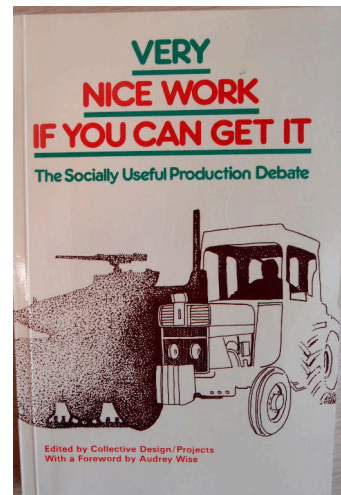
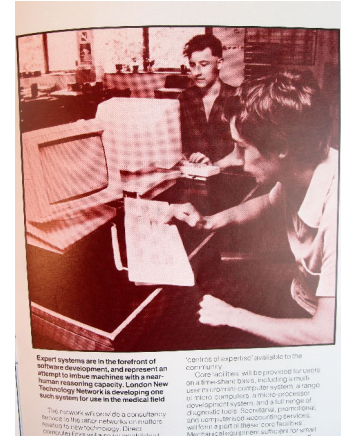
- Access to tools, expertise, and training – design, manufacturing tools, ICT
- Walk-in workshops open to anyone – sited away from ‘alienating’ polytechnics
- Examples: women’s computing co-operative, Brass Tacks (a white goods refurbishment co-op), electric bike, disability devices, play equipment, heat pumps, wind turbines, fuel poverty campaign, road-rail bus and transport campaigns ...



- Product Bank for sharing designs and prototypes developed in the workshops (over 1,500 deposited)
- Cultivating participatory design methods, prototyping and product development, mobilising alliances and networks, creating new enterprises, training and skills

Working it out in Technology Networks ...

- Open doors is only the start – need good community development – social mobilisation, e.g. LEEN
- Workshops are not insulated from divisions in wider social world – participatory design techniques, e.g. LIN
- Prototyping for training and enterprise cf. technological agit prop for awareness and mobilisation
- Moving from prototyping into manufacture requires control over capital
- Socially useful production needed favourable political economies cf. new right and old left
- Importance of radical impulse for new practices – spaces where the rules are different and alternative cultures are possible



Film: The Plan

<http://lucasplan.org.uk/more-about-the-lucas-plan/>

Film: POC21

<https://vimeo.com/140692615>



POC21: Proof of Concept

[Practical counter to COP21 – people prototyping & eco-hacking at an ‘innovation camp’ on outskirts of Paris

[Over a hundred makers, designers, engineers, scientists and geeks, drawn from various international activist networks

[Tools for developing a variety of technologies of practical and symbolic value for low carbon living

[Low cost wind turbines; facilities for urban farming; 3D-printed bottle-top water filtration device; easy-build cargo bikes; open source energy monitors, permaculture; low consumption recirculating showers; portable solar power packs

[Open source designs and machining instructions, >500,000 visits on Instructables website & crowd-funded development of a portable, solar-powered water filtration device

[Powwow 1972 etc etc – grassroots innovation movement

Digital fabrications and tools for people

[Increasingly accessible and versatile digital design and manufacturing technologies

[Globally connected workshop communities and networks experimenting with the possibilities of these technologies – open hardware, commons-based peer-prototyping

[The tools: CAD, laser cutters, 3D printers, microcontrollers, sensors, apps, maps, instruction videos, collaborative projects, and traditional tools in metal, wood & textiles

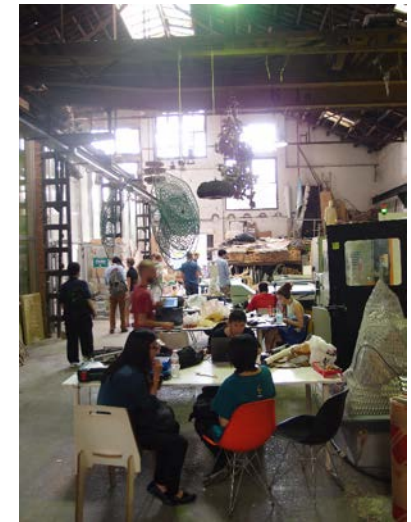
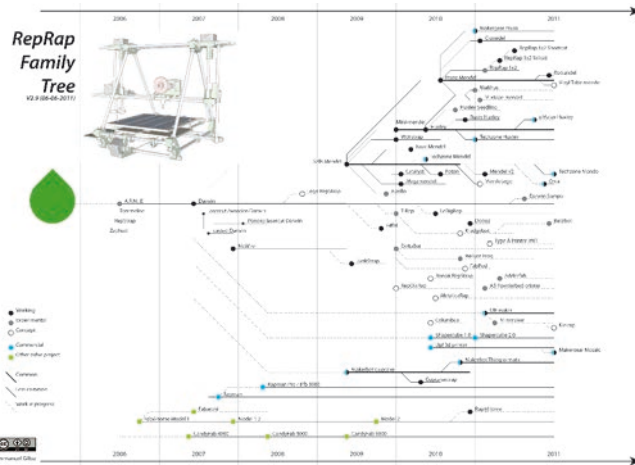
[Weaving into social fabric through – Hackerspaces, FabLabs and Makerspaces, ‘maker movement’

[There is a commitment to openness, co-operation and collaboration: designs, instructions and projects are documented, filmed and shared using web-based social media – knowledge commons

[Exploring more democratic practices in design, prototyping, and production-consumption?

[Or start-up entrepreneurship, Silicon Valley, tech-fix distractions?

[Digital reboot of old ‘tools-for-people’ ideals of Whole Earth, appropriate technology, village industries, and others?



Con RECYPuntos encuentra las opciones para poder reciclar o disponer mejor tus residuos



Selecciona el Residuo a Reciclar



Ubica a donde puedes llevarlo



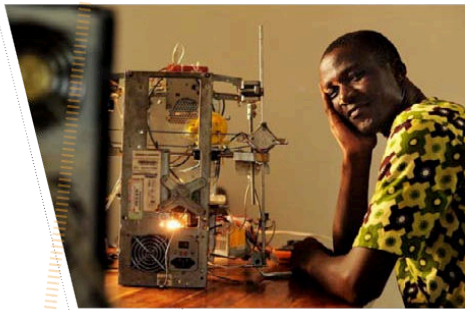
Deposítalo en el lugar escogido



MAKERS FOR DEVELOPMENT



SHOWCASING THE POTENTIAL OF MAKERS



INEXPENSIVE RAPID PROTOTYPING
E-WASTE MANAGEMENT

E-WASTE 3D PRINTER

Afate Gninkou from Togo, built a 3D printer from parts he scrounged from broken computers, other e-waste electronics and \$100 worth of specialized electronics:



SO WHAT?

Costs a fraction of those currently on the market.

Recycles otherwise environmentally damaging waste.

Made with local parts means that it can be fixed with local parts.



REDUCES PLASTIC ON THE LANDFILL
INCREASES SELF-SUFFICIENCY
STREAMLINES SUPPLY CHAINS

PLASTIC RECYCLING FOR 3D PRINTERS

Waste plastic can be recycled into both 3D printer filament (the only consumable in 3D printing) and injection molding pellets, ready to be converted into new projects:

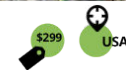


SO WHAT?

Cost of 3D printing filament decreases by a factor of 10.

While lower quality than virgin filament, it enables even cheaper prototyping.

Recover the energy in the plastics to save oil, plastic and energy.



COMMUNITY DRIVEN & CROWDSOURCED
RAPID DATA COLLECTION
POST-DISASTER ASSESSMENT

AIR QUALITY SENSOR NETWORK

A self-contained sensing unit attached to cars and other vehicles that reports localized air quality data in real time:



SO WHAT?

Crowdsources data logging for up-to-date information with limited investment.

Supports different sensors - radiation levels, carbon monoxide, dust and others.

Automated collection and anonymized upload makes it easy to use.



COMMUNITY DRIVEN URBAN IMPROVEMENT
REVITALISING PUBLIC SPACES
SOCIAL EMPOWERMENT

PUBLIC SPACE FURNITURE

Building community furniture together with the community: skateparks, plant pots, soccer goals and park benches:



SO WHAT?

Provides opportunities for social interaction, social mixing and social inclusion.

Facilitates the development of community ties.

Entrepreneurs can make their own furniture in the Fab lab and sell it at the local market.



WATER QUALITY AND FLOW RATE MONITORING
ENVIRONMENTAL CONSERVATION
POLICY PLANNING

WATER SENSORS

A network of sensors that collect water quality and quantity data in realtime, analyze its patterns and predict future trends:

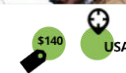


SO WHAT?

Sensors can easily be swapped to any low-cost, low power sensor: flow rate, chemical indicators, etc.

Track water quality to work out the cleanest time to collect water.

Send contamination warning and repair status alerts



FabCity Barcelona – Ateneus de Fabricació Digital

[Political leaders had a vision for a self-sufficient smart city by 2054

[Investing in workshops: Ateneus for every neighbourhood of the city: exchanges between global knowledge commons and situated urban production

[Access to digital fabrication tools seen as 21st C public infrastructure: democratising technology and empowering communities to develop own livelihoods

[Controversial associations with Smart City

- **food banks and occupation of an Ateneu**
- **Silicon Valley entrepreneurialism**

[Working closely with community associations to embed Ateneus in neighbourhoods

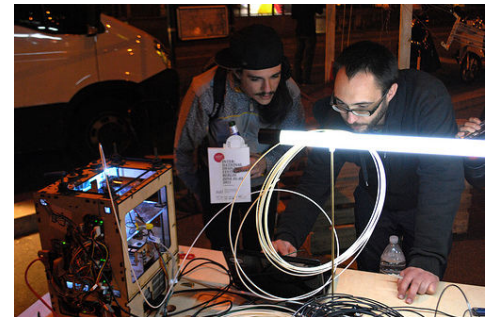
- **education**
- **family**
- **social innovation**
- **sustainability**

[Change in political leadership: Barcelona en Comú / Mayor Ada Colau

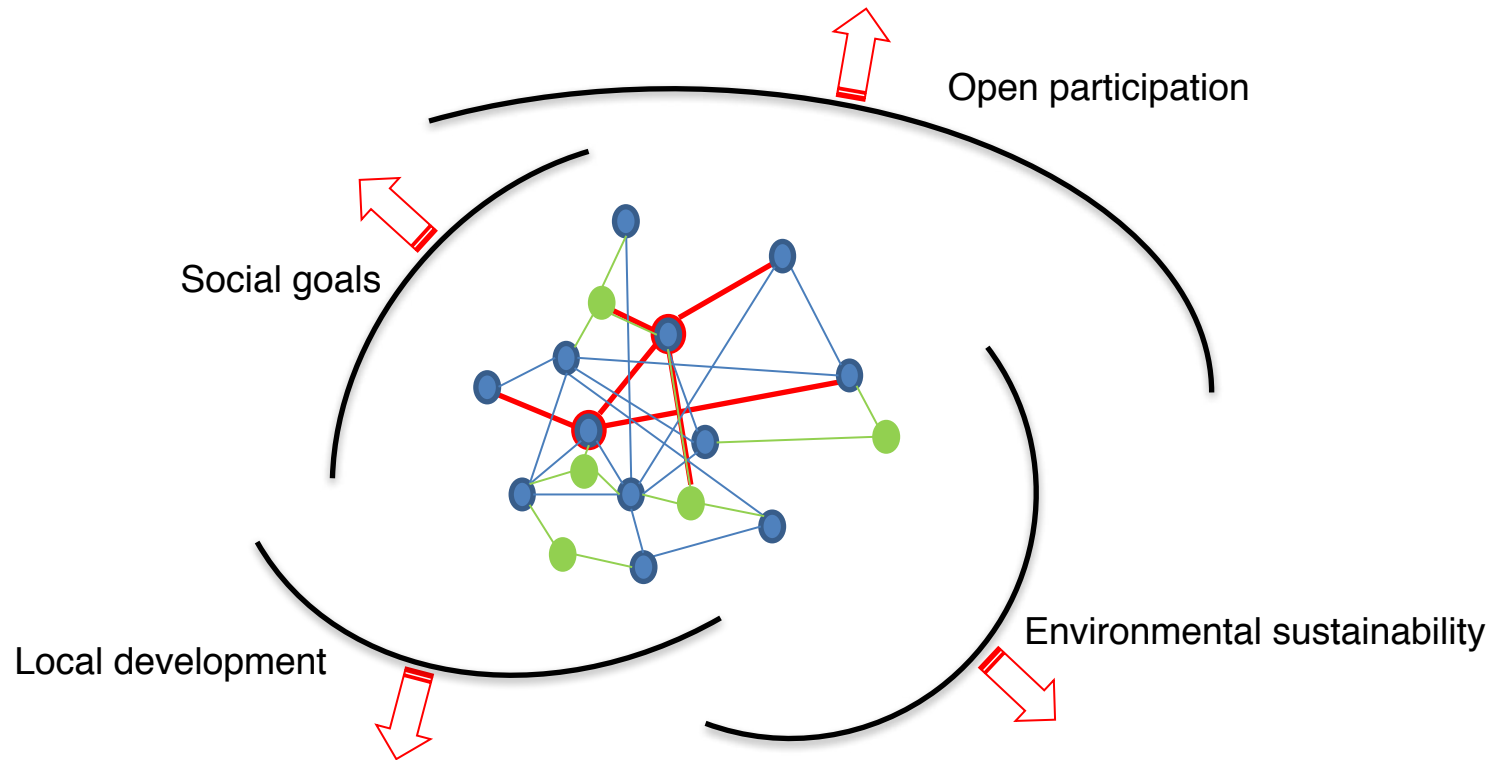
- **Technology sovereignty & creating spaces for exploring platform co-operativism and free culture? FabCity reconfigured and maker neighbourhood in Poblenou**

Makerspaces: learning with history?

- Makerspaces, FabLabs and Hackerspaces
- Responding to structural changes - technical, cultural, social, economic, political – but power to shape them?
- Different world now – but some fundamentals remain the same?
 - Varied roles that prototyping can play
 - Challenges involved in creating new social relations in workshops different to the outside world
 - Connecting grounded practices of making to big forces of political economy and social movements
 - How to orientate maker (material) culture to sustainable developments?

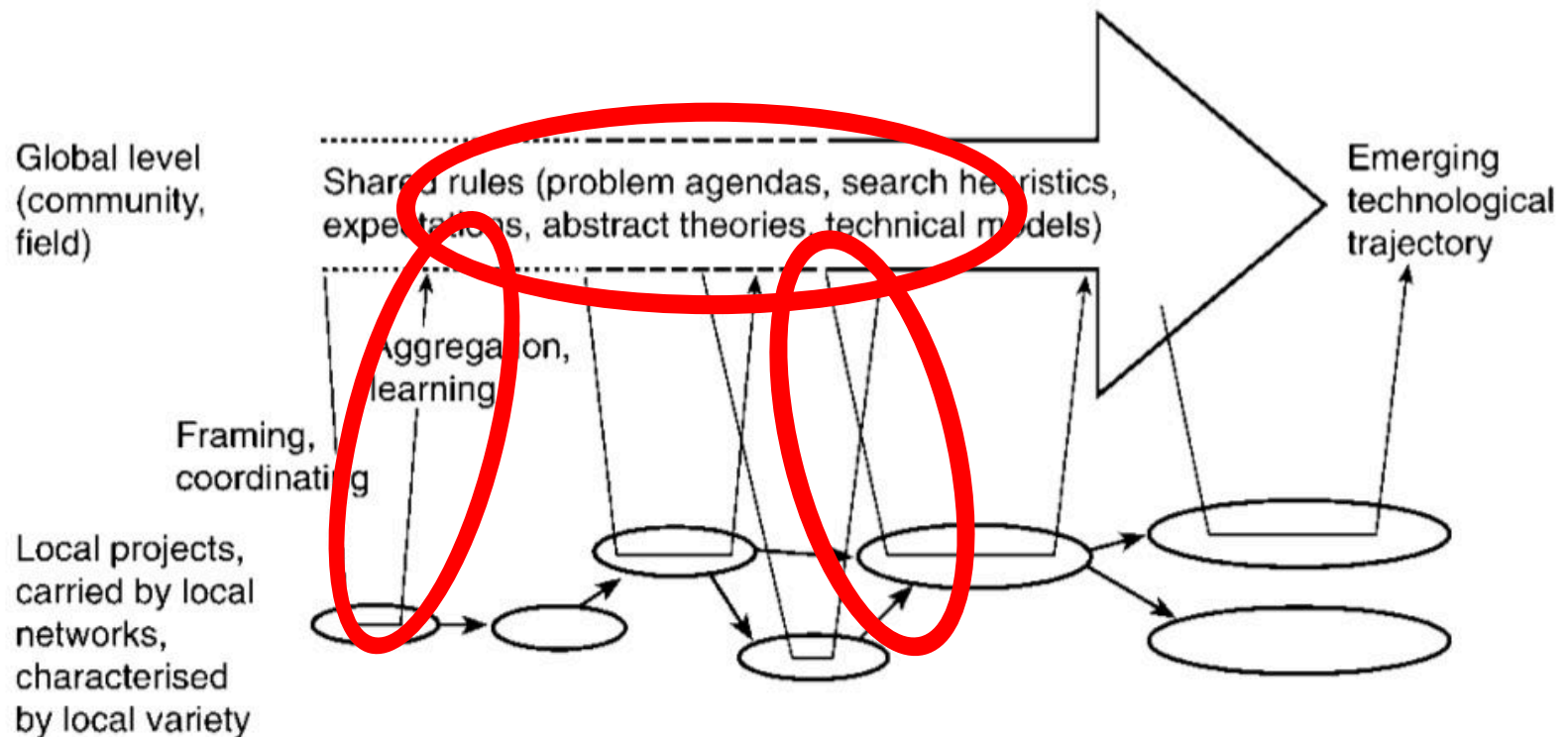


Helping grassroots niches grow and spread?

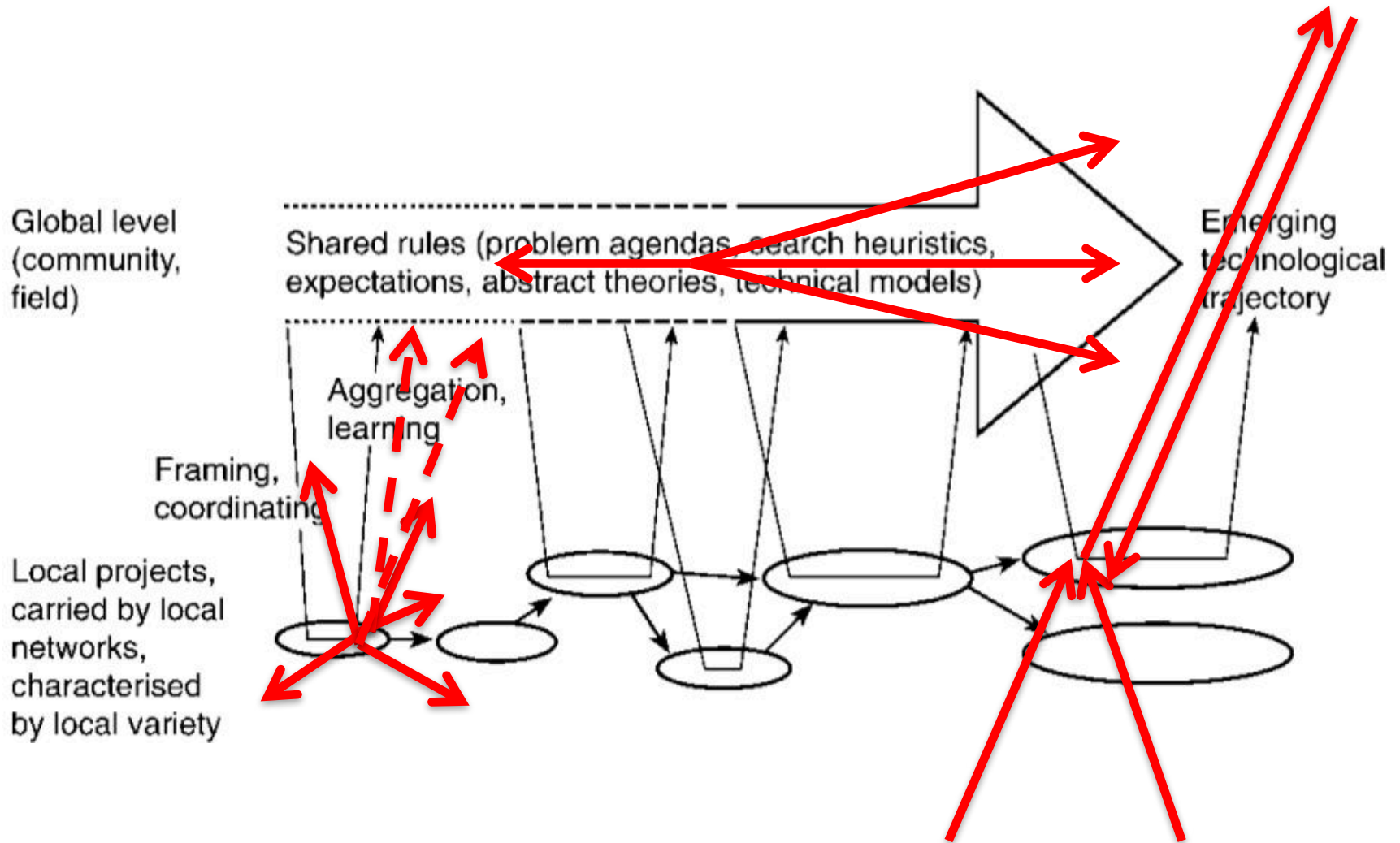


- [funding
- [supporting
- [networking
- [partnering
- [lobbying
- [activism

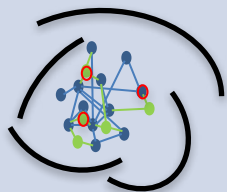
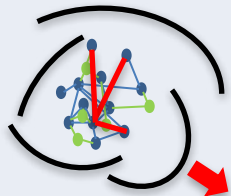
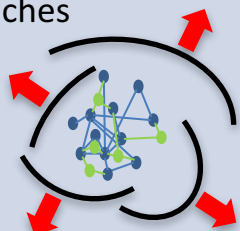
- Strategic Niche Management theories highlight the importance of 'intermediary actors' in building robust niches (Geels and Deuten 2006).
- Intermediary actors engage in 'relational work' (Moss 2009) connecting local projects with one another, with the wider world and in building institutional infrastructure.



Complications ...



Contending niche perspectives ...

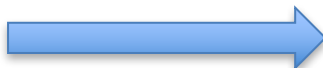
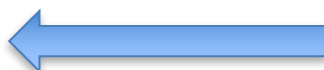
Perspective	Niche purposes	Niche developments
<p>Strategic niche management</p> 	<p>Instrumental improvements in niche solutions (grassroots ingenuity)</p>	<ul style="list-style-type: none"> • Projects as demonstrations • Knowledge for diffusing solutions • Intermediaries disseminate good practice • Politics is rational & objectifying
<p>Niche policy advocacy</p> 	<p>Advocacy that makes niche solutions matter to others, e.g. policy or business or science (grassroots empowerment)</p>	<ul style="list-style-type: none"> • Projects exemplify narratives • Knowledge argues what matters • Intermediaries lobby • Politics is argumentative & pragmatic
<p>Critical niches</p> 	<p>Unsettling and debating innovation norms and challenging power from alternative positions (grassroots critique)</p>	<ul style="list-style-type: none"> • Projects challenge norms • Knowledge about structures • Intermediaries mobilise critical reflection • Politics is agonistic & radical

Three perspectives in grassroots digital fabrications ...

Perspective	Local experiments	Knowledge priorities	Niche intermediation	Politics
<p><i>Strategic niche management</i></p> <p>Offering effective design and make objects relevant to societal challenges</p>	<ul style="list-style-type: none"> • Emphasis rests in nurturing design and fabrication capacities. • Projects oriented to personal and local issues and aspirations. • Providing access to tools in open workshops in communities and institutions such as schools, libraries, universities, and museums. 	<ul style="list-style-type: none"> • Training in the use of various digital and craft design and fabrication tools. • Suggestions and instructions for a wide variety of projects. • Codification of knowledge and sharing through open, online platforms – including video demonstrations and tutorials. 	<ul style="list-style-type: none"> • Creating and supporting platforms on how to design and make things. • Maker Faires and other public events that intrigue and enthuse people about making. • Advice on how to set up workshops and run training programmes. • Academies for training managers and protagonists in further diffusion. 	<ul style="list-style-type: none"> • Overt politics is avoided – emphasis on fun, creativity and self-fulfillment. • Sees development unproblematically and pragmatically, in terms of building capacities in individuals. • Contribute to citizenship by enthusing peoples' interest in technologies. • Denies that fabrication tools and making artefacts has a politics. • Reluctant to get drawn into any wider implications.
<p><i>Niche policy advocacy</i></p> <p>Activity that makes fabrication workshops matter for policy-makers</p>	<ul style="list-style-type: none"> • Emphasis rests in demonstrating the seeds of a new industrial revolution. • Projects oriented to start-ups, entrepreneurship and STEM skills. • Materialising prevailing policy discourses locally. 	<ul style="list-style-type: none"> • Demonstrating production of value through prototyping. • Aligning with technology-fix policy discourses for re-shoring manufacturing, innovation, smart urbanism, and/or circular economy. 	<ul style="list-style-type: none"> • Promoting the maker vision to politicians, business, agencies and policy institutions, e.g. through reports, event invitations, films. • Providing links between prototypes and investment and finance. • Attracting education and training institutions to the possibilities of hands-on making. • Connecting workshops, hackathons etc to conventional innovation systems and production. 	<ul style="list-style-type: none"> • Celebrates Silicon Valley start-up entrepreneurialism. • Neo-liberal political orientation towards open markets, individual initiative, and knowledgeable creativity as basis for competitiveness and economic development.
<p><i>Critical niches</i></p> <p>Unsettling and debating institutional conventions and asserting redistributed, open and more democratic forms of design and making</p>	<ul style="list-style-type: none"> • Emphasis rests in commons-based peer-production and postcapitalist orientation. • Projects seen as manifesting and contributing to free culture. • New forms of social organisation and material culture. 	<ul style="list-style-type: none"> • Challenges to capitalist political economies of design and manufacturing. • New high-tech platforms and working practices for commons-based approaches to innovation and technology sovereignty. • Embodiments of alternative socio-economic activity, such as repair, repurposing, and craft production 	<ul style="list-style-type: none"> • Connecting to compatible developments in commons-based political economy, such as interest in citizen's income schemes. • Celebrating and facilitating alternative forms of innovation. 	<ul style="list-style-type: none"> • Sharp criticism of any capture or enclosure of free culture, e.g. actively undermining towards intellectual property regimes. • Differences between the orientations, cultures and practice of various kinds of fablabs, makerspaces and hackerspaces matter, similarly with events.

Characteristics	Mainstream STI institutions	Grassroots innovation movements
<u><i>Political dimensions</i></u>		
Predominant actors	Universities, Public labs, commercial firms, ministries and other public institutions, international funding agencies	Civil society, NGOs, social movements, cooperatives, neighbours, community groups
Priority values	Science advance, for profit innovation/ not necessarily focused on social inclusion	Social justice / not necessarily focused on for profit innovation
<u><i>Mechanisms</i></u>		
Principal incentives / drivers	Market demand and regulation / science competence	Social needs, community empowerment, solidarity
Sources of investment	State/ Corporate funded, venture capital	Development aid, community finance, donations, State funding
Forms of appropriability	Intellectual property framework strongly biased towards patent-based innovation	Not appropriated by individuals – seen as common goods
<u><i>Knowledge dimensions</i></u>		
Sites of innovation	Laboratories and R&D institutes, board rooms and ministries, market based firms	Community projects and participatory processes, social movements, hackerspaces
Predominant forms of knowledge	Scientific and technical knowledge / generic & codified	Local, situated knowledge / indigenous knowledge
Emblematic technological fields	Biotechnology, ICTs, Nanotechnology	Organic food, small scale renewable energies, water sanitation

Insertion of GI into STI



Mobilisation of GI to transform STI

Conclusions: what can we learn from grassroots innovation?

[There is a wealth of innovation amongst the grassroots, and it takes various forms

[Intermediaries play influential roles when they help the development of grassroots niches

[Does development insert grassroots ideas into conventional innovation systems, or is it trying to transform those systems? Niche as source of ingenuity, empowerment or critical transformation? What sense does 'scaling' make under each perspective?

[The perspectives presented here are a simplification. Complex and dynamic innovation hybrids are always evolving and interacting.

[Always ask, what are the power relations in these interactions? Whose perspective and priorities count? Whose knowledge counts? Who controls resources?

[These are inherently political questions! Analysis can help characterise the issues, but democratic process should handle the decisions ...

Thanks!

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[www.grassrootsinnovations.org / www.steps-centre.org]

[Smith, A., Fressoli, M., Abrol, D., Arond, E. and A., Ely (2016) Grassroots innovation movements. London: Routledge.

[Grassroots innovation and innovation democracy – FoE Big Idea ‘thinkpiece’ and new STEPS Centre Working Paper]

PATHWAYS TO SUSTAINABILITY

GRASSROOTS INNOVATION MOVEMENTS

[Socially Useful Production
UK, 1970s -1980s

[Appropriate technology
South America, 1970s - 1980s

[People's Science Movement
India, 1960s – present

[Hackerspaces, FabLabs y Makerspaces
International, 2000s – present

[Social Technologies Network
Brazil and Argentina, 2000s – present

[Honey Bee Network
India, 1990s - present

[Mix of STS and social movement theories

[Framings, spaces and pathway dilemmas
in diverse contexts

Adrian Smith, Mariano Fressoli,
Dinesh Abrol, Elisa Arond and Adrian Ely

earthscan
from Routledge

Restart Party

[Voluntary meet-up groups who repair consumer electronics and ICT – guided self-help

[London-based, but parties nationally and in other countries too

[Podcasts, radio programmes, data dashboard (1st 3 years: 85 parties, 1270kg e-waste prevented, 25.8 tons embodied CO₂

[‘fix our relationship with electronics’

- Practical skills and activity
- Social relations and material culture with gadgets
- Hands on way of engaging deep issues, like political economy of production and consumption – design for manufacture and obsolescence cf. repair and durability

[‘When we maintain, make and resell together, we create local value in a throw-away economy where many things are manufactured far away ...’ (Janet Gunter, Restart Party)

https://www.youtube.com/watch?v=OMNvGK6NrGE&list=PLSg_ZQpW0hSEul9uFt2kuWY3A2tSxgHMF&index=3

ACTIVITY

In groups design policies for promoting, supporting and developing grassroots innovation

Who? What? How? Why? Where? When?

Making grassroots innovation visible?

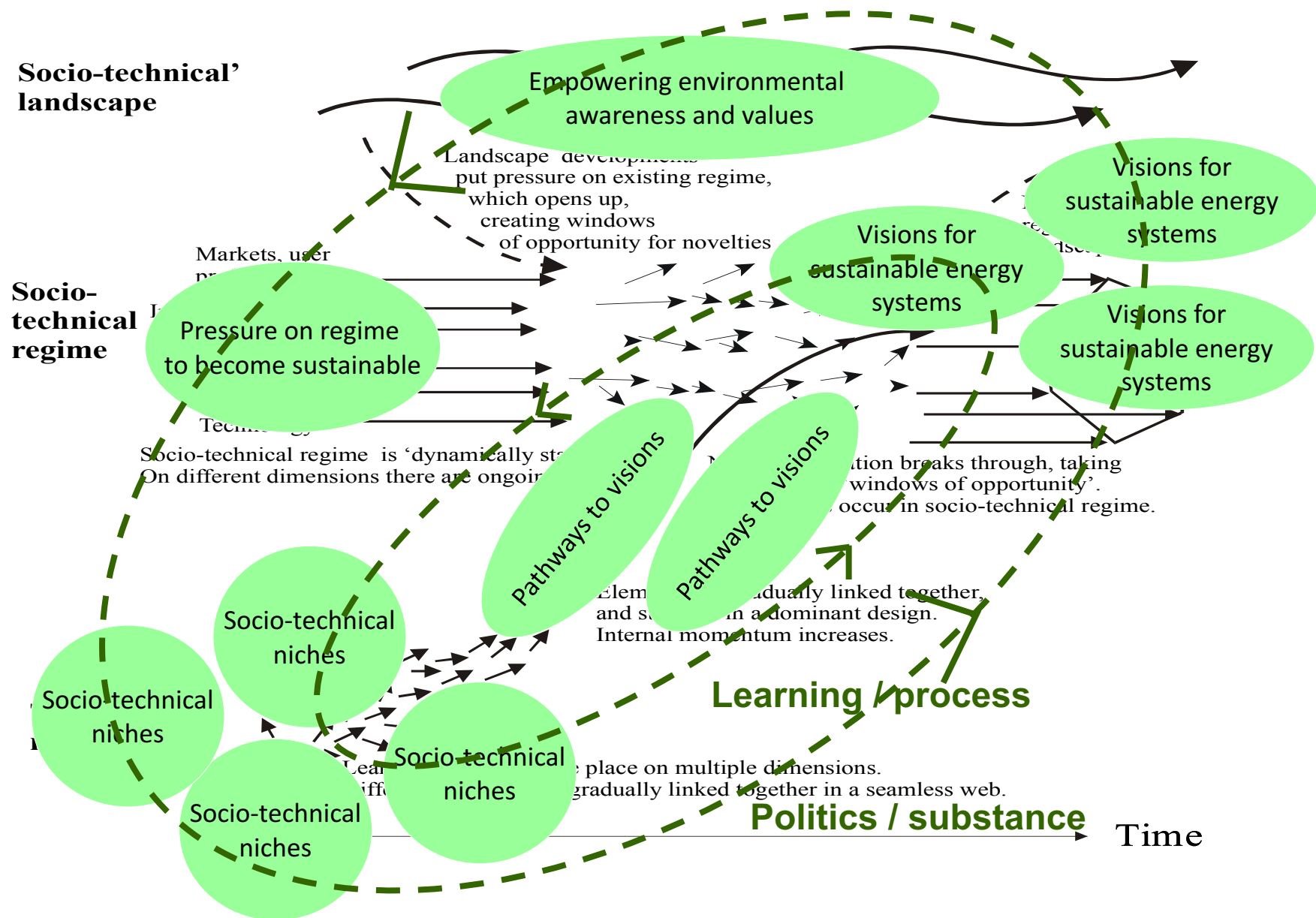
Helping specific initiatives?

Building up institutions?

Boosting the impact or consequences of grassroots innovation?

Changing social, cultural, economic and political conditions so that grassroots has greater voice and influence?

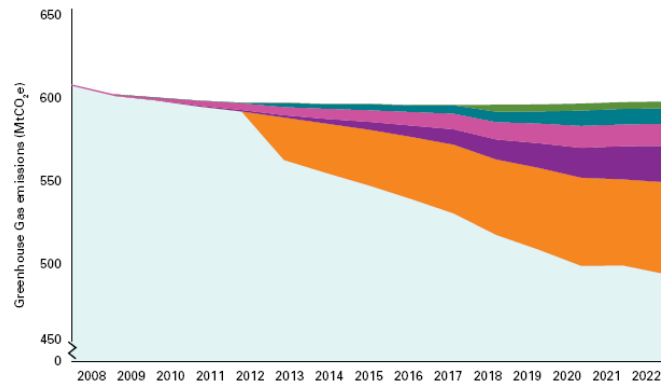
Transition Management



Transition Management

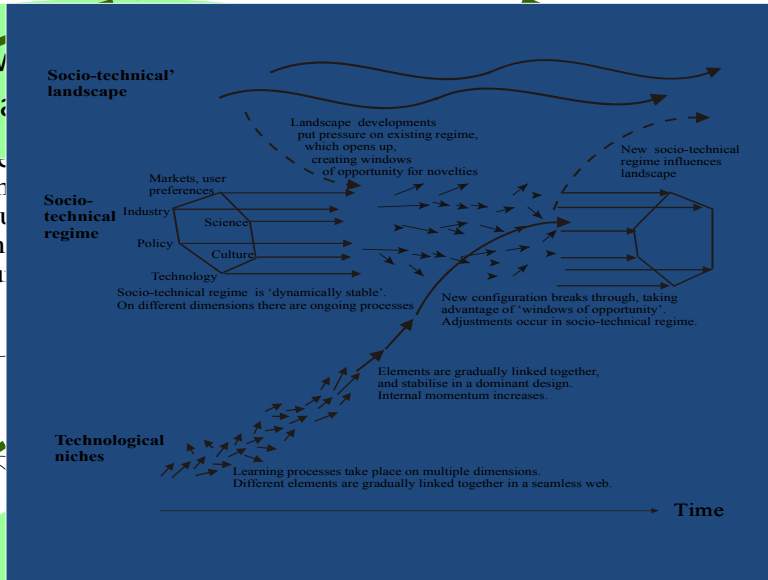
Chart 1

The plan will reduce emissions in every sector

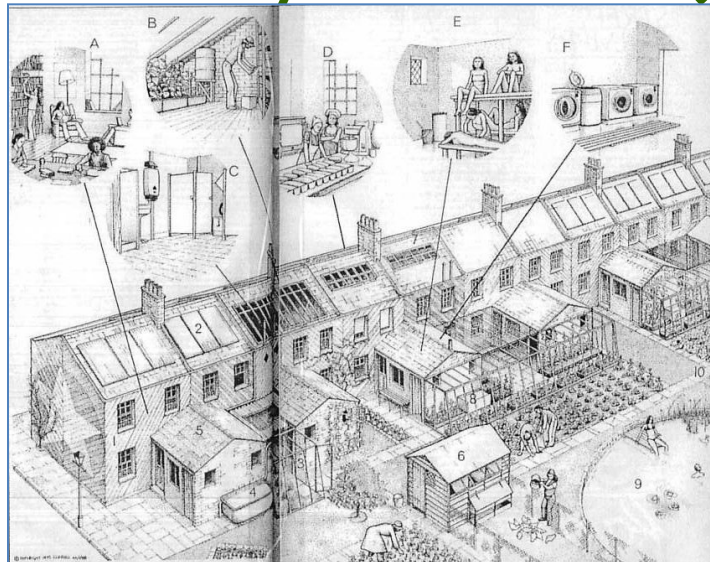


Source: Department of Energy and Climate Change
Note: The impact of policies prior to the 2007 Energy White Paper is included in the baseline; without these policies, UK emissions would be higher.

Employment
away
landscape developments
put pressure on
which opens up
creating windows
of opportunity



Technically stable
on different dimensions there are ongoing



Pathways to vision

Pathways to vision

Windows of opportunity? occur in socio-technical regime.

Whose visions count?

Elements are gradually linked together, and stabilise in a dominant design. Internal momentum increases.

Learning / process

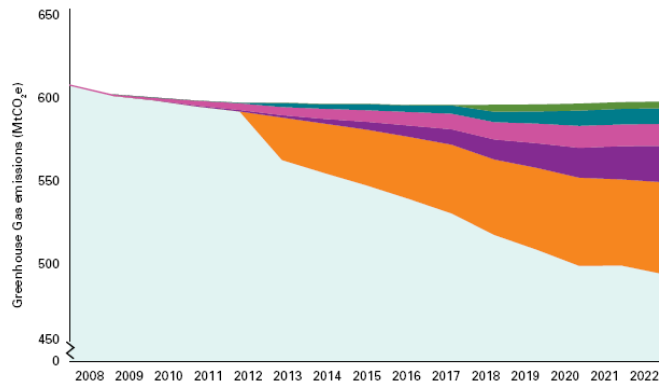
Learning processes take place on multiple dimensions. Different elements are gradually linked together in a seamless web.

Politics / substance

Time

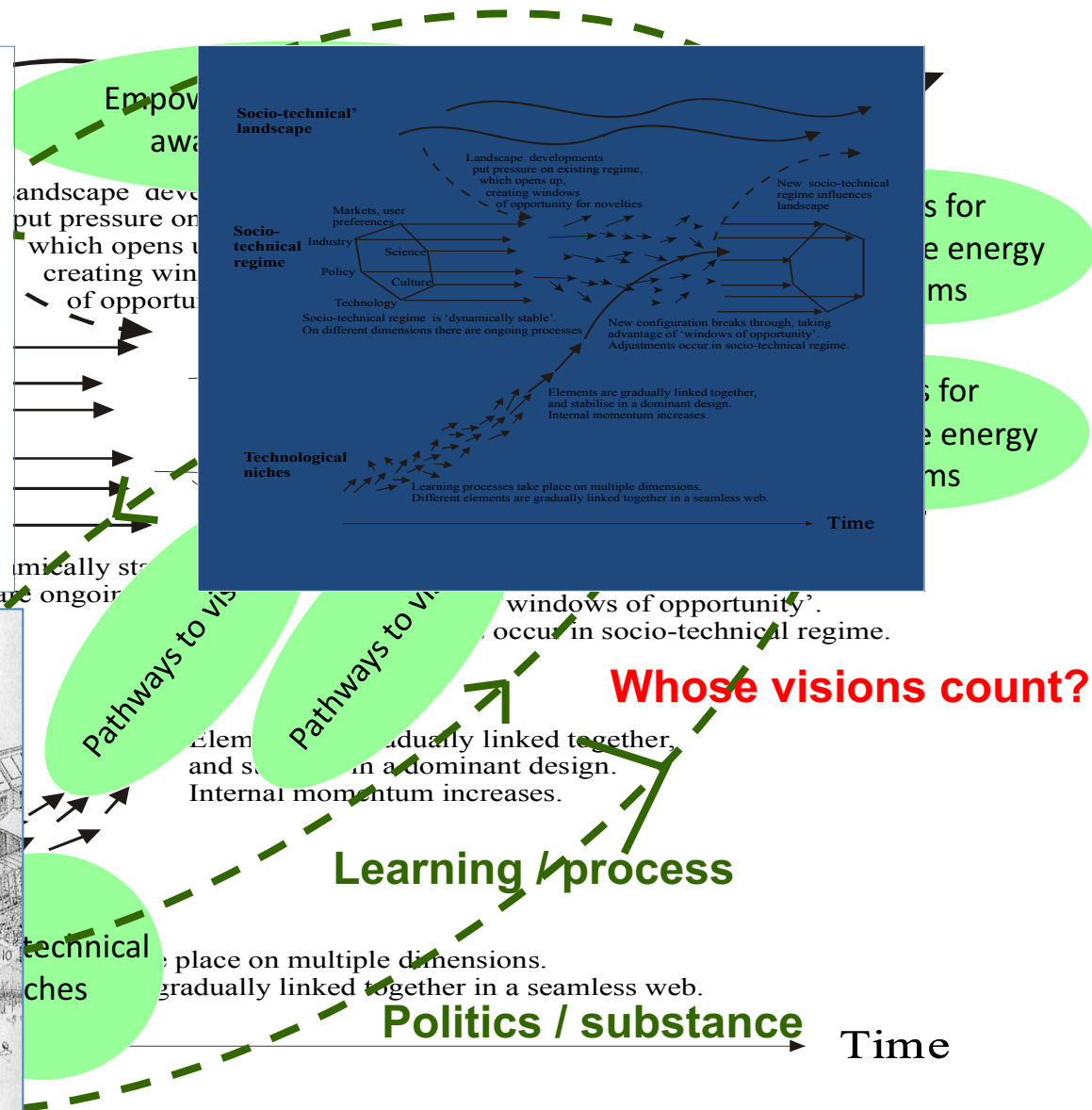
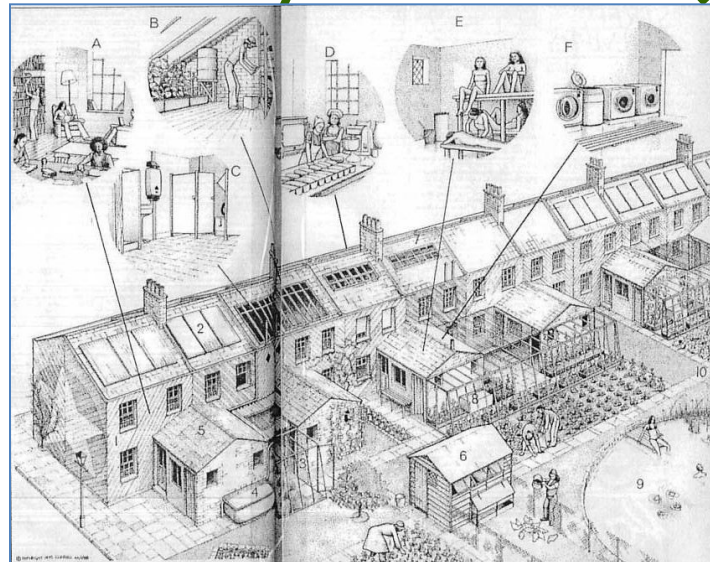
Transition Management

The plan will reduce emissions in every sector



- Power and heavy industry
- Transport
- Homes and communities
- Workplaces and jobs
- Farming, land and waste

Note: The impact of policies prior to the 2007 Energy White Paper is included in the baseline; without these policies, UK emissions would be higher.



Transition Management

