

# The multiple contributions of peer innovation to socio- technical change

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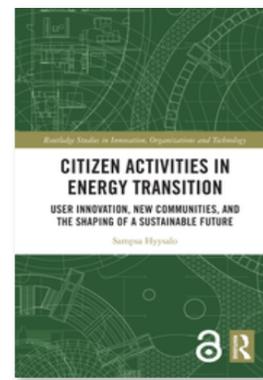


# A three step argument

Step 1: Confirming: Innovation by citizen users in new technologies is plentiful, serious and catalyzed by peers in online forums

Step 2: Opening up peer innovation: Citizen users innovate beyond technological objects and uses, but the full scope gets ignored

Step 3: Opening up beyond Innovation: Intertwined range of user contributions to sociotechnical change may outshine direct innovation impact



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Book

## Citizen Activities in Energy Transition

User Innovation, New Communities, and the Shaping of a Sustainable Future

By *Sampsa Hyysalo*

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## A taxonomy of users' active design engagement in the 21st century

Cindy Kohtala  , Sampsa Hyysalo, Jack Whalen

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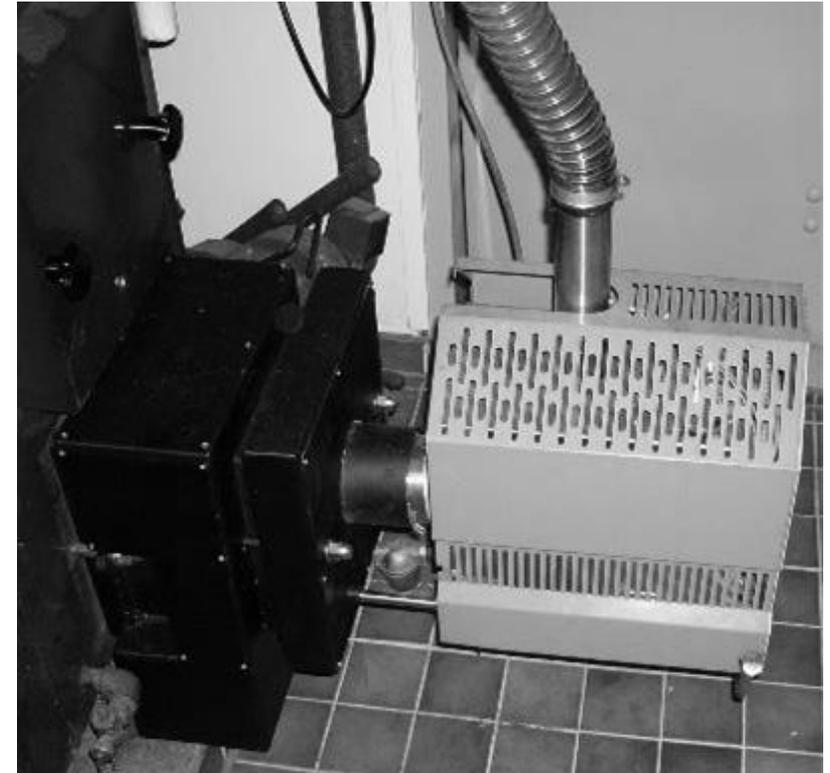
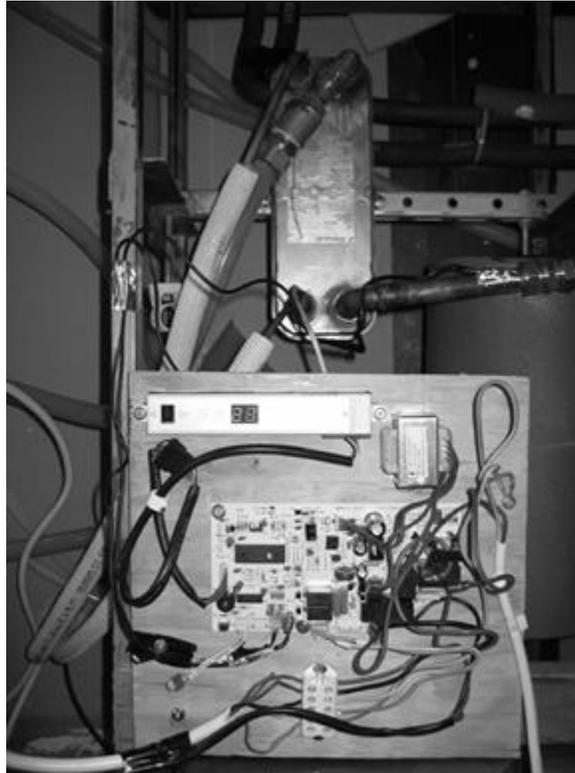
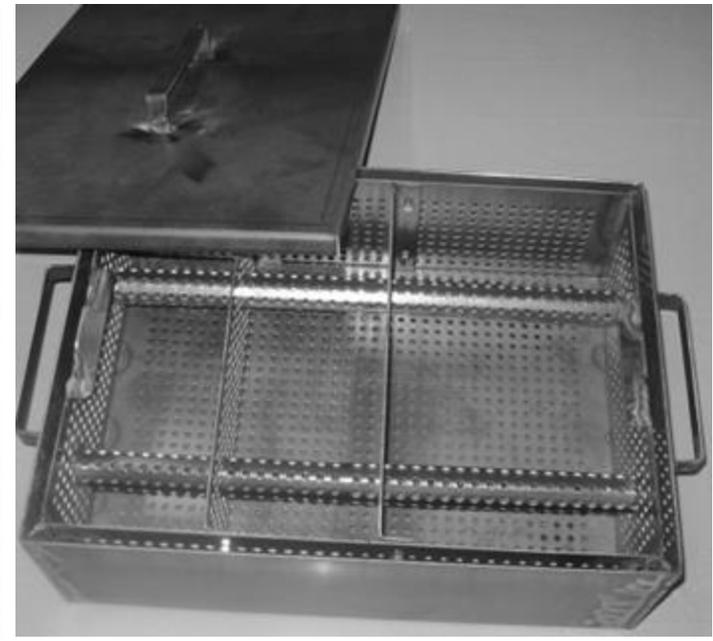
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Step 1: Confirmatory: Innovation by citizen users in new technologies is plentiful, serious and catalyzed by peers in online forums

## Citizen user innovation in Finnish small scale Renewables, 2011-2014

- Over 400 innovative DIY/DIT projects in DIY sections
- 216 innovations in dom exp eval
- 105 inventions in heat pumps
- 87 in wood pellet burning systems
- 24 in Solar heat and solar PV systems
- From system level designs to modifications
- Cover practically all technical subsystems in heat pumps, pellet systems and solar heat
- Occur from early to relatively late in proliferation process (after 30% of max diffusion)
- Catalyzed by peer interactions in internet communités (0,5k-8k contrib /20k -500k posts, 150m reads)



Step 2: Citizen users innovate widely beyond technology, but the full scope gets ignored, 2010-2018

**Table 1 Articulating users' engagement with design in key disciplines**

<i>Field</i>	<i>Typology Categories, Key Referents</i>	<i>What Types Of Categories Are Represented</i>	<i>What Is Left Out</i>
<b>Design studies</b>	From reactive to proactive, Passive consumer to Professional designer: Adapter, Maker, Explorer, Creator (Hermans, 2015, expanding on Sanders, 2006)	Focus is on designing in relation to roles and creativity: from use as-is (passive consumer) to increasingly salient changes in objects and uses	Typology excludes changes in meanings, design settings and innovating
<b>User innovation</b>	Routine use, Repurposing, Material adaptation, User modifications, Additions by users, System wide designs by users (Hyysalo, Juntunen, & Freeman, 2013; de Jong et al., 2015; Hienerth et al., 2014)	Categories focus on design and especially innovation, from the object and use as-is (routine use) to increasingly salient changes in objects, local settings and new uses	Typology excludes new meanings and not-new-to-the world aspects of active use
<b>Human-computer interaction</b>	Direct appropriation, Substitution, Combination, Enlargement, Contrast, Constraint (DeSanctis & Poole, 1994)	From direct use of a technology structure to variations on its use and meanings and implying changing local settings	Typology focuses on designed software as an object that is not directly redesigned
<b>Consumption studies</b>	Cultural dupe, Personalization, Customization, Craft Consumption (Campbell, 2005); Appropriation, Objectification, Incorporation, Conversion (Silverstone et al., 1992)	Focus is on creativity and consumption as an activity with meaning: from use and object as-is (as a passive consumer) to increasingly salient changes in meanings, objects, local settings and to some extent uses	Typologies do not address differences between active consumption and locally new designs or new-to-the-world innovation
<b>Science &amp; Technology Studies</b>	From subscription to de-inscription of form and meaning and re-inscription of material qualities (Akrich, 1992; Latour, 1987); From consumption to production: Reinterpretation, Adaptation, Reinvention (Eglash, 2004)	Focus is on the meanings and semantics of user engagement with objects, their settings and contexts, new uses and misuses, altering designed objects	Typologies do not differentiate innovations

**Table 2 Articulating collective forms of users' engagement with design in key disciplines**

<i>Field</i>	<i>Typology Categories, Key Referents</i>	<i>What Types Of Categories Are Represented</i>	<i>What Is Left Out</i>
<b>Design studies, Human-computer interaction, Consumption studies intersection</b>	Build modules from scratch, Use modules, Assemble components, Integrate, Configure/Personalize, Create workarounds, Make social agreements, Re-integrate social practices (Botero, 2013)	Focus is on how users engage in design to strengthen and innovate collective aspects of practices in communities: altering elements of practice in community work to forming new community procedures	Typology does not address ideology explicitly, addresses global platforms only partially
<b>User innovation, Science &amp; Technology Studies intersection</b>	Local settings, interaction arenas, global platforms (Benkler, 2006; Johnson, 2013; van Abel, Evers, Klaassen, & Troxler, 2011); Brokering contacts, Facilitating learning, Configuring systems (Stewart & Hyysalo, 2008)	Focus is on how users facilitate and configure for each other in communities: from intermediating in community work and social learning, to configurers of practices, organizations and global platforms	Typologies do not address ideologies, address only some processes within communities and organizations
<b>Science &amp; Technology Studies</b>	Regularization, Counter-significations, Counter-appropriations, Counter-delegation (non-use, modifications, hacking, reuse), Reconstitution (Pfaffenberger, 1992)	Categories' intensities increase from actively resisting the dominant imaginary (and uses, objects and meanings) to immediate changes and innovations in imaginaries, community identities and collective practices	Typology does not address global platforms

	USE AS-IS	ACTIVE USE	USER DESIGN	USER INNOVATION	
USES	Routine use <i>3D-print an existing file</i>	Adjustments, work-arounds <i>make a change in print procedure</i>	New local uses, repurposing <i>use 3D-printer in new way, to print bigger objects</i>	New-to-the-world uses, technique innovation, exaptation <i>make printer able to print a new material within existing setting options</i>	INDIVIDUAL
OBJECTS	Reproducing an object <i>3D-print a pre-existing object</i>	Adjustments, tweaks <i>make a change in the object</i>	Altered objects, new objects <i>design new kind of 3D-printed object</i>	User innovation <i>design and 3D-print a bridge</i>	
MEANINGS, IMAGES	Reproducing a meaning <i>3D-print a symbolic object (a 'Yoda' head)</i>	Re-signifying, re-sensing <i>3D-print one's own head</i>	New meanings, re-signification <i>espouse, propagate what should and should not be printed</i>	Radically new meanings <i>3D-print glass object using sand and solar power</i>	
LOCAL SETTINGS	Routine use of given equipment / tools <i>use lab equipment using given tutorial or procedure</i>	Repair and maintenance, troubleshooting, diagnosing, bricolage <i>paint and surface treat a 3D-print by hand, with equipment to hand</i>	Altered protocols, altered local equipment, new integration of equipment <i>use a new procedure for recycling and reusing filament with old and new equipment</i>	New-to-the-world protocols, local equipment and integration <i>develop 'Fabman' service locally for machine access and billing</i>	



ORGANIZATIONS,  
COMMUNITIES

Normal community activity, peer help and facilitation, induction  
*help another user with 3D-modelling software*

Subverting rules; coordinating, organizing, managing; configuring for others  
*organize the documentation process in the lab*

Renewal of rules; changing community procedures  
*organize a workshop in the fablab on recycling PLA to renew procedures*

Formation of new rules, procedures for counter-contexts; new community configurations  
*adopt indigenous community's governance model for meetings*

IMAGINARIES,  
IDEOLOGIES

Re-enactment of imaginary, proselytizing  
*espouse fablab ideology, keep a blog*

Re-creating aspect of imaginary, performance, display  
*make a 'green' variant within fablab ideology, exhibit 'sustainable' fabbed objects*

New partial realization of imaginary, reconstitution  
*showcase how circular 3D-printing can be made a reality, invite others to bring filament waste to be recycled*

New partial realization of new imaginary  
*show how sustainable, circular, local production can be made a reality in a new economic model*

COLLECTIVE

INTERACTION  
ARENAS, GLOBAL  
PLATFORMS

Use of content as-is, bridging, brokering  
*download a 3D-printing file from Thingiverse, give recommendations to other makers and platforms, recruit others to maker event*

Contributing content, feeding to platform, recruiting, global community work  
*create categories or tags in a repository, organize a maker event*

Contributing to infrastructure, altering form, establishing new interaction arena for the domain  
*re-categorize a discussion forum, organize a new type of maker event*

Creating new-to-the-world infrastructural platforms, platform components  
*create a platform like GitHub, PHP-BB*

All degrees and types of active use and user innovation can be identified in just digital-physical maker activities (fab labs, maker spaces, hacker spaces)

In 12 other domains our cases – physical, digital, service – our data shows active use and user design in next to all degrees and types, user innovation common in individual forms

Step 3: Innovation is intertwined in wider range user contributions to sociotechnical change – and may not be the most important one in its direct effects, 2016-2020

**Adoption and routine use**  
*Signals the market to niche, regime and landscape actors*



**Adjustments and adaptation**  
*Paves the way to user innovation*



**Championing**  
*In projects and communities*



**Innovating**  
*Adds solution availability and builds competence for deep technical intermediation*



**Building and maintaining communities**  
*Allow the pooling of competencies and resources*

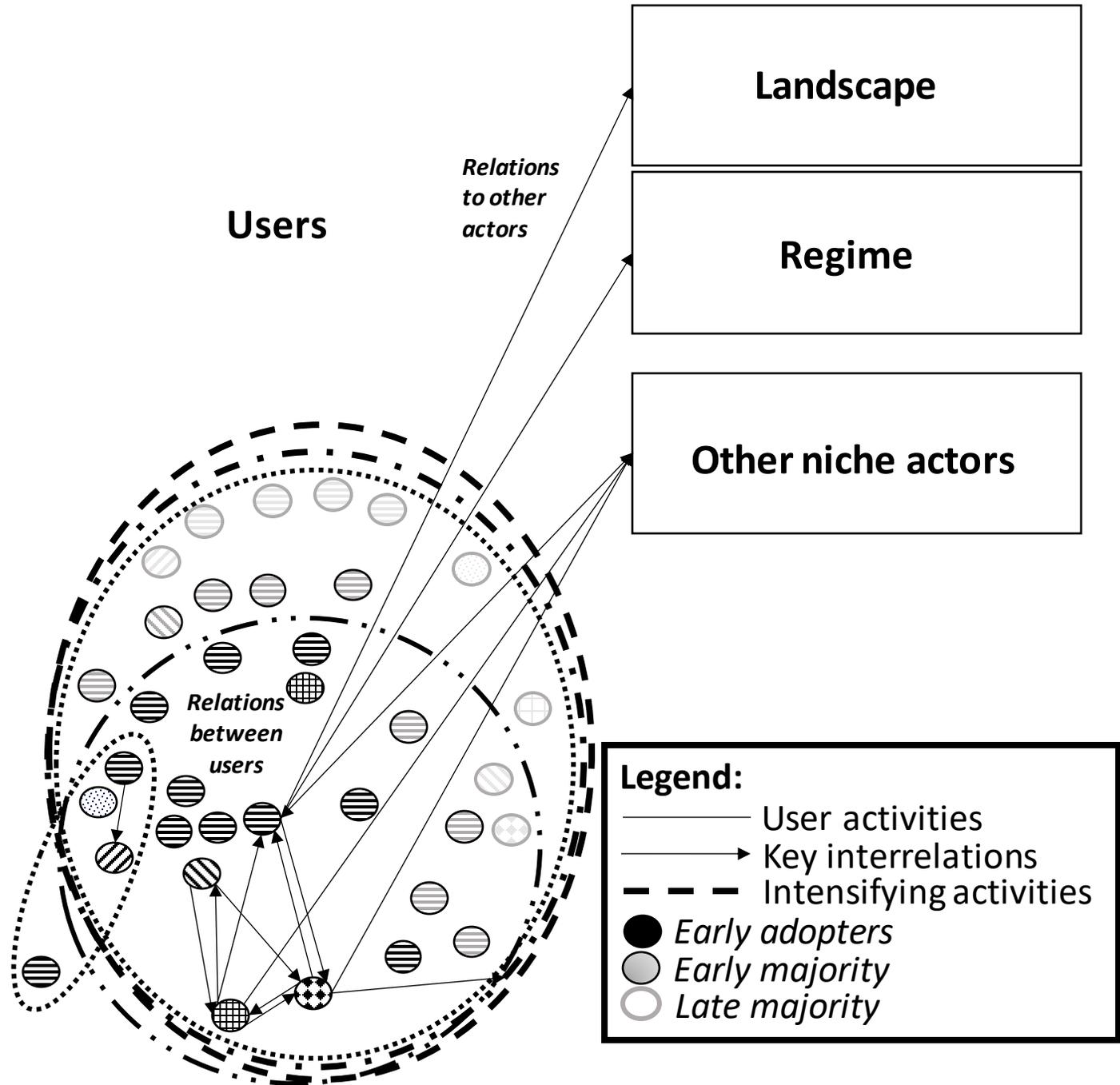


**Intermediating**  
*purchase, installation and adaptation and towards other niche actors*



**Market creation**  
 By word-of-mouth and qualifying new solutions; providing up to date solution and market information.

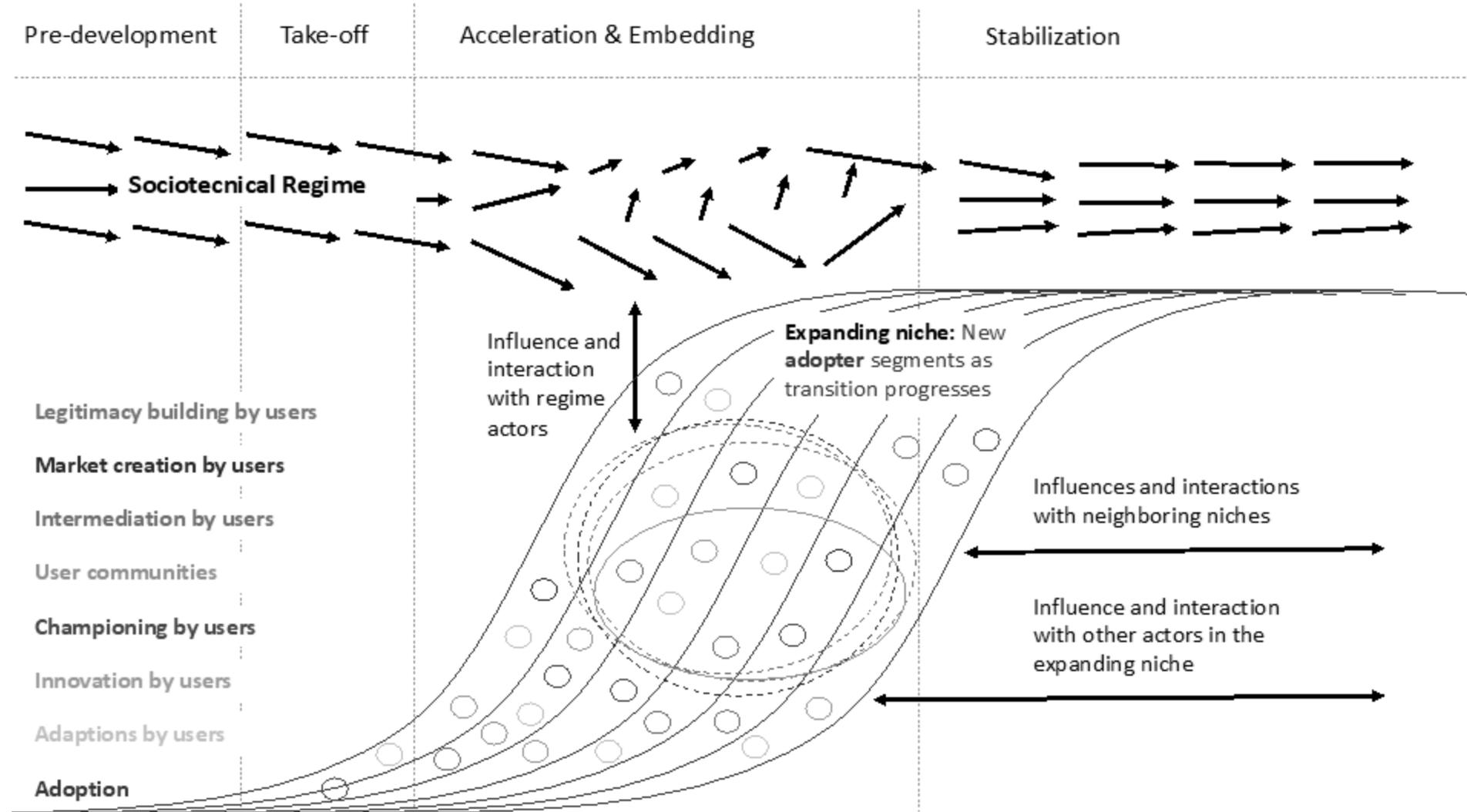
**Legitimacy creation**  
*legitimizing discourse on new option and tackling regime attacks and views*



All these user activities present from early installations to late in the proliferation process

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Peer-intermediation, market creation and legitimacy creation intensify with the growth of Internet communities 5-30% of max proliferation.



# Concluding

Step 1: Innovation by citizen users in new technologies is serious and catalyzed by peers

Step 2: Citizen users innovate beyond objects and uses

Step 3: Peer innovation is intertwined in a range user contributions to sociotechnical change

- ➔ **The dominant focus on how users and user collectives alter objects likely reveals a tip of the iceberg of their overall contribution**
- ➔ **The activities in peer communities merit research beyond how they support specific types of innovation**
- ➔ **The more 'sociological' aspects of user innovation poorly visible without ethnography and/or in-depth interviewing; a methodological challenge to both surface and generalize**

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