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

Kohtala, C., Hyysalo, S. & Whalen, J (2019) A taxonomy of user' active design engagement in 21st century. *Design Studies 67,* 27-54
https://doi.org/10.1016/j.destud.2019.11.008

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How do people engage with goods, designs and systems?

A common shift in several disciplines 1990 - 2010: People found to be active in various ways in appropriating and using technologies, objects and systems

But how exactly are they “active”? What does it mean more analytically?

Are there conflating terms or missing scope of action?

A synthesizing review and examination against 12 in-depth longitudinal studies

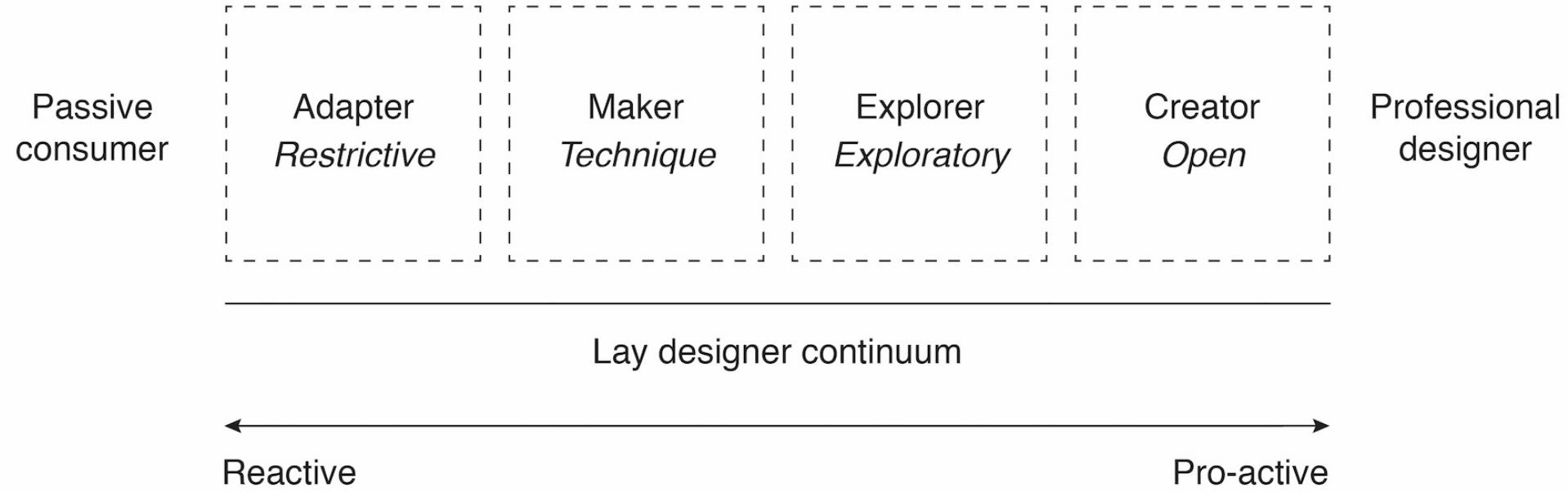
Consumption Studies:

“appropriation – objectification – incorporation – conversion”
(Silverstone, Hirsch, Morley, 1992;
Berger, Hartmann, Punie, Ward, 2006)

“cultural dupe, personalization, customization, craft consumption”
(Campbell, 2005)

Design Studies:

"passive consumer, adapter, maker, explorer, creator, professional designer" (Sanders, 2006)



'Schema XI Lay designer continuum, from adaptor [sic], to maker, to explorer, to creator, adopted from Sanders (2006)'. Source: Hermans, 2015: 157.

Information Systems, HCI:

“Direct appropriation – Substitution – Combination – Enlargement – Contrasting – Constraining”
(DeSanctis and Poole, 1994)

(Salovaara, 2012;
Liikkanen and Salovaara, 2015;
Helminen, Ainoa, Mäkinen, 2016)

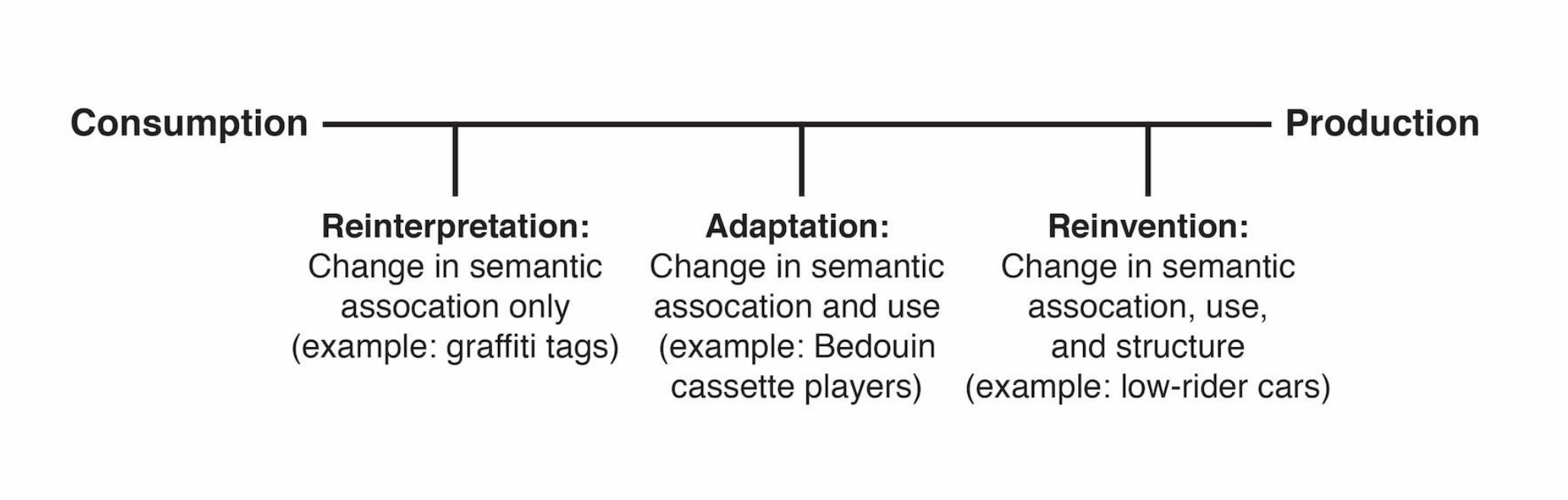
User Innovation:

"routine use, user modifications and user innovations"
(de Jong, von Hippel, Gault, Kuusisto, Raasch, 2015)

"routine use – repurposing – material adaptation – user modifications – additions by users – system wide designs by users"
(Hyysalo, Juntunen, Freeman, 2013;
Hyysalo, Jensen, Oudshoorn, 2016)

Science & Technology Studies:

"technological regularization, technological adjustment, technological reconstitution"
(Pfaffenberger, 1992)



'The consumption-production dimension'. Source: Eglash (2004: xi).

FIELD	TYPOLOGY CATEGORIES, KEY REFERENTS	WHAT TYPES OF CATEGORIES ARE REPRESENTED	WHAT IS LEFT OUT
Design studies	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
User innovation	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, von Hippel, & Berg Jensen, 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.
Information systems	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
Consumption studies	Cultural dupe, Personalization, Customization, Craft Consumption (Campbell, 2005); Appropriation, Objectification, Incorporation, Conversion (Silverstone, Hirsch, & Morley, 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
Science & Technology Studies	From subscription to deinscription of form and meaning and reinscription of material qualities (Latour, 1987; Akrich, 1992) 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

Why so?

Compartmentalization of academic research

Different terms and contexts, lit reviews remain within an area

Different research designs and methods:

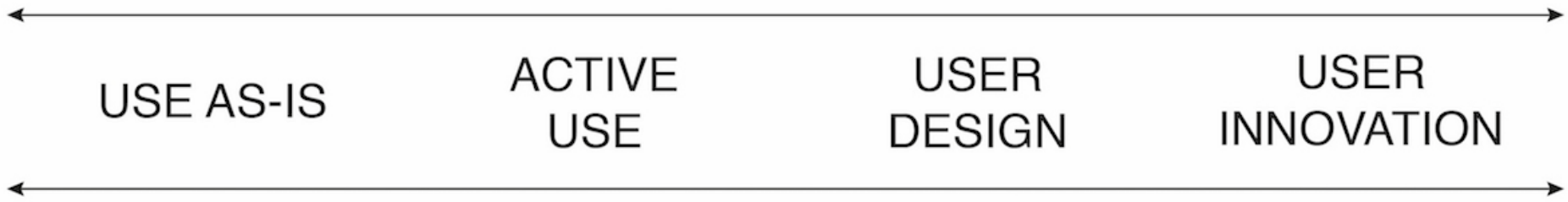
Quantitative and survey researchers easily focus on objects

Changes in meaning evident if you talk with people

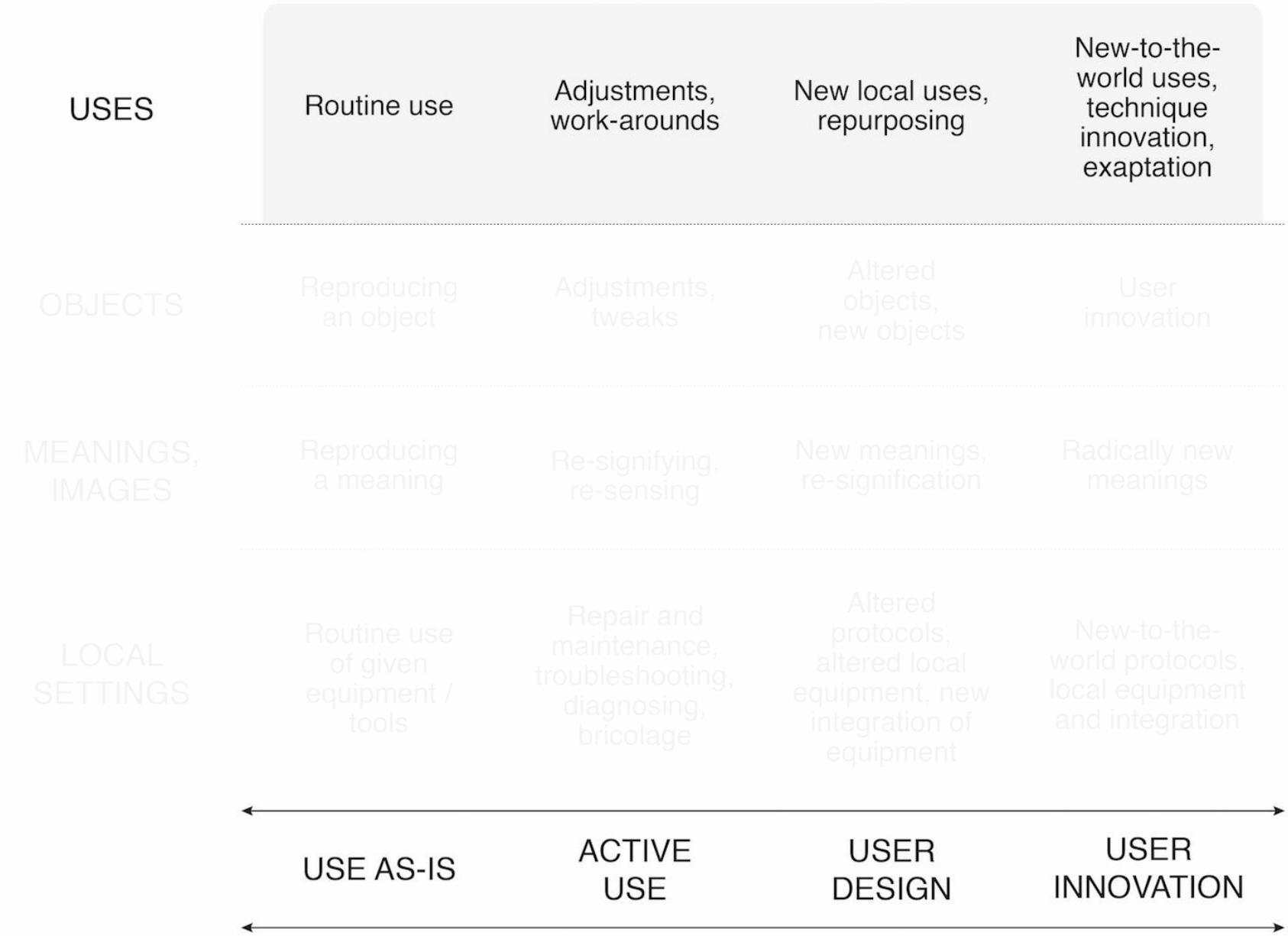
Changes in uses and settings apparent upon observation…

Different epistemic and ontological assumptions in the background fields

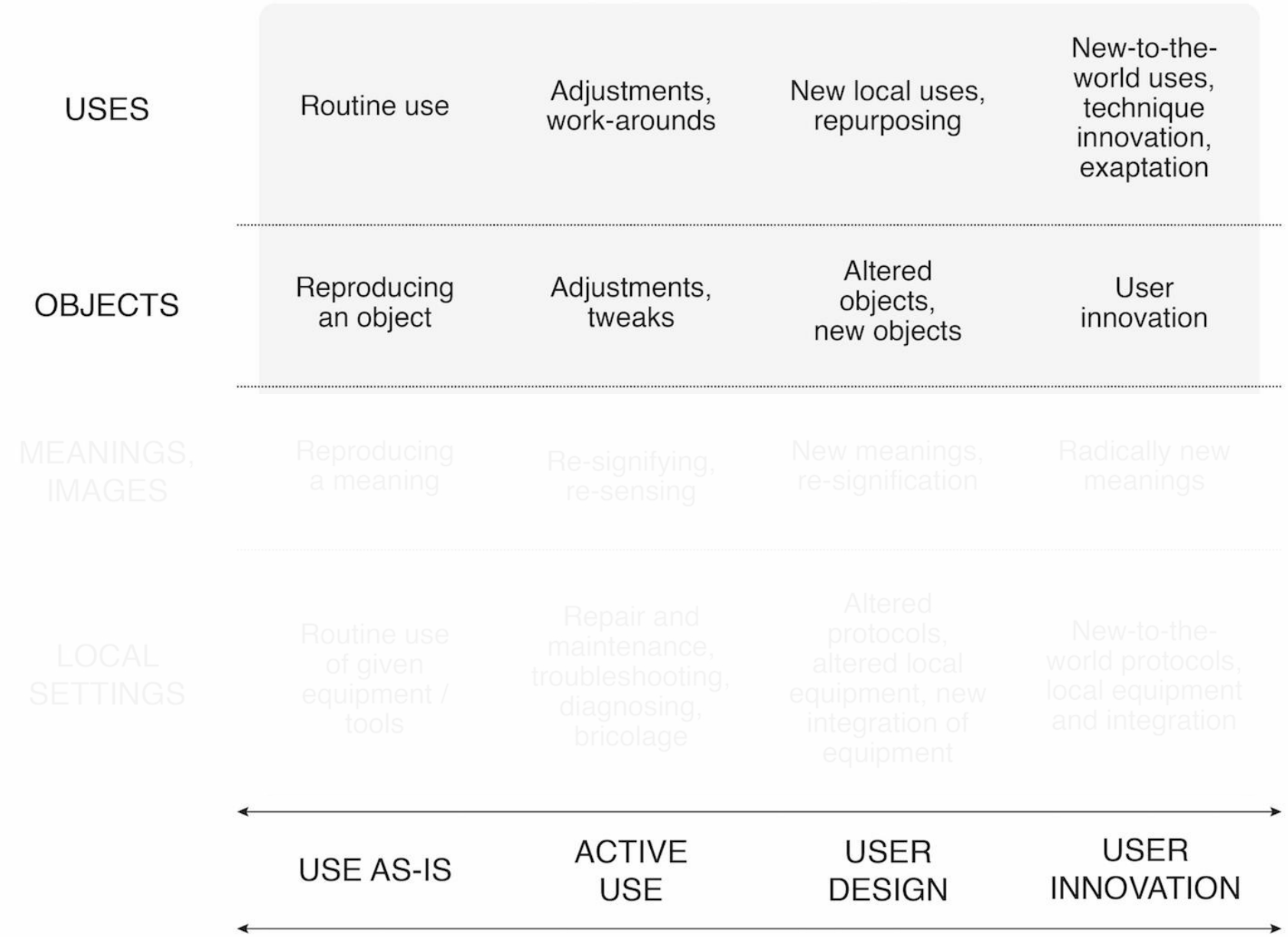
Innovation or not and by whom? Vs. what do consumers do?



A Basic Framework for Users' Active Engagement with Products and Services



A minimal framework for discussing users' active design engagement in a given setting



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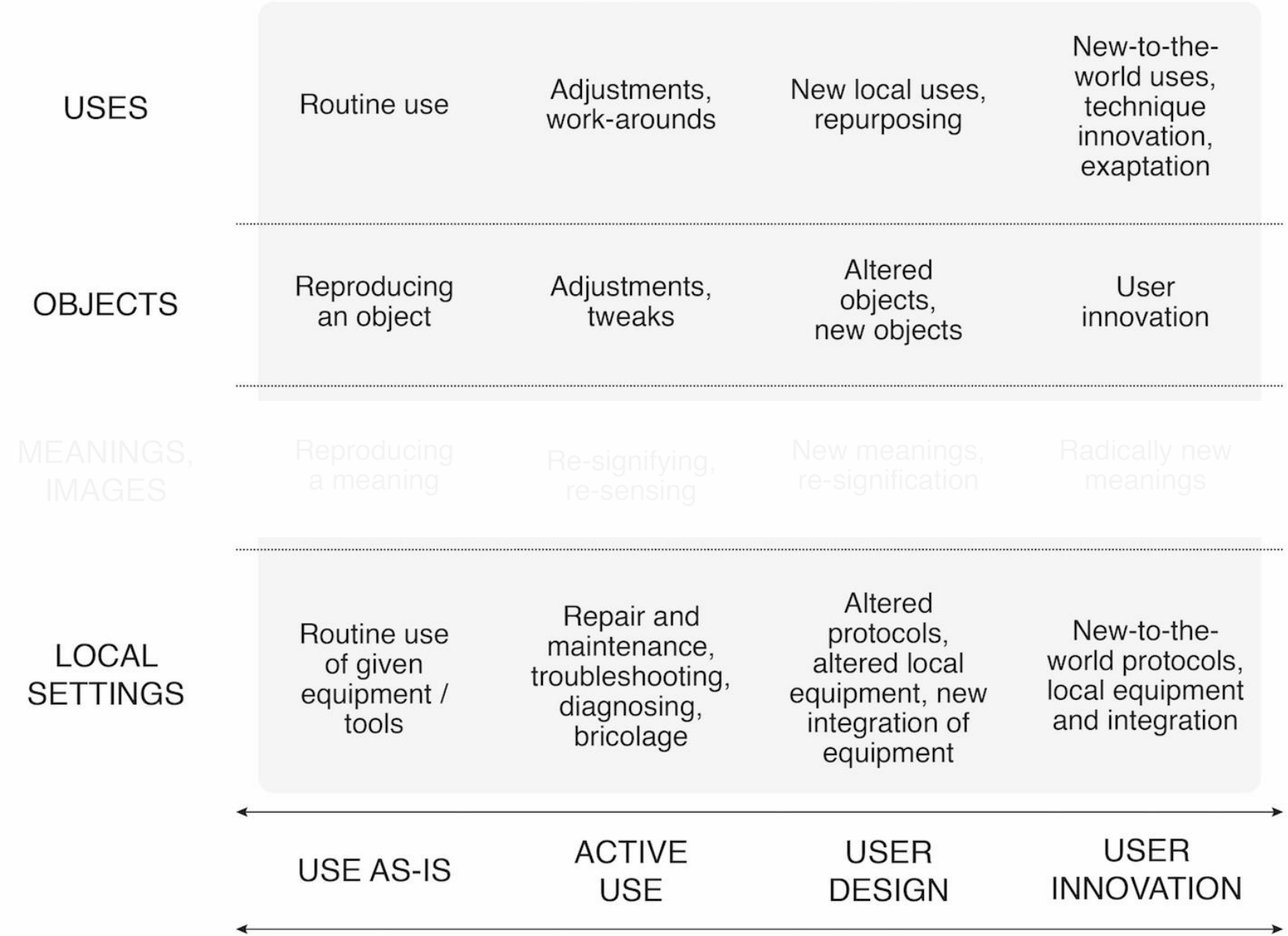

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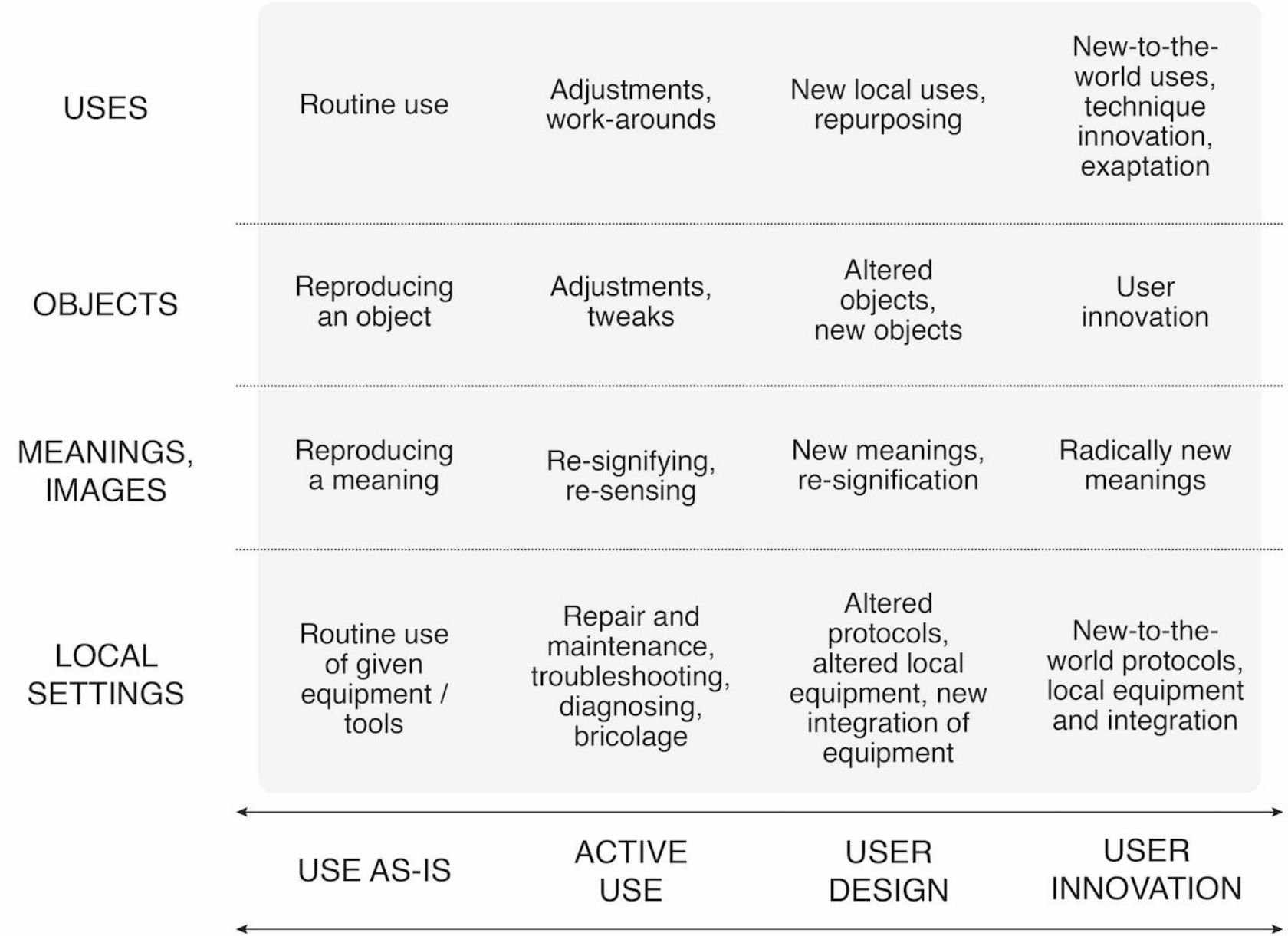

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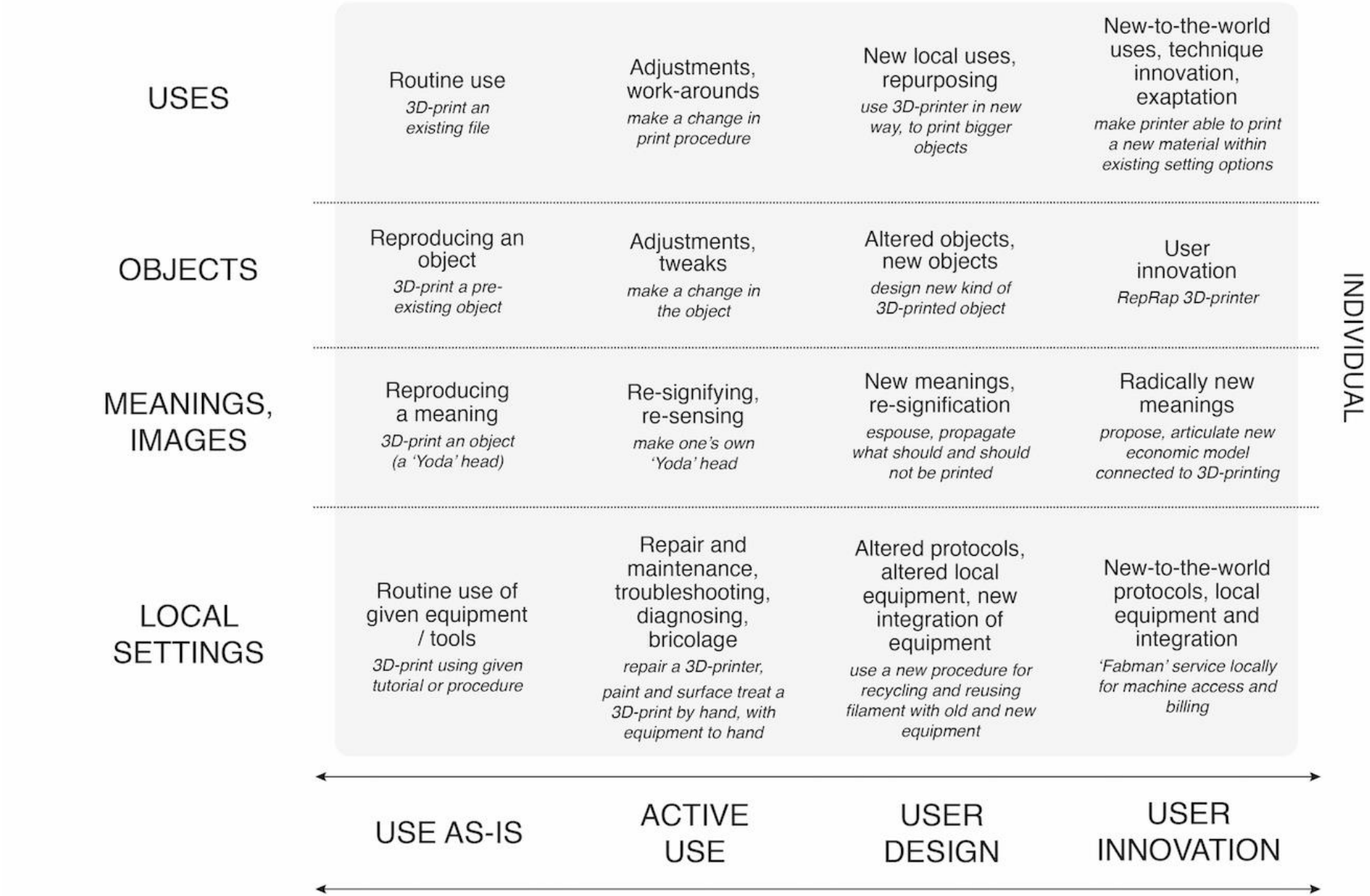
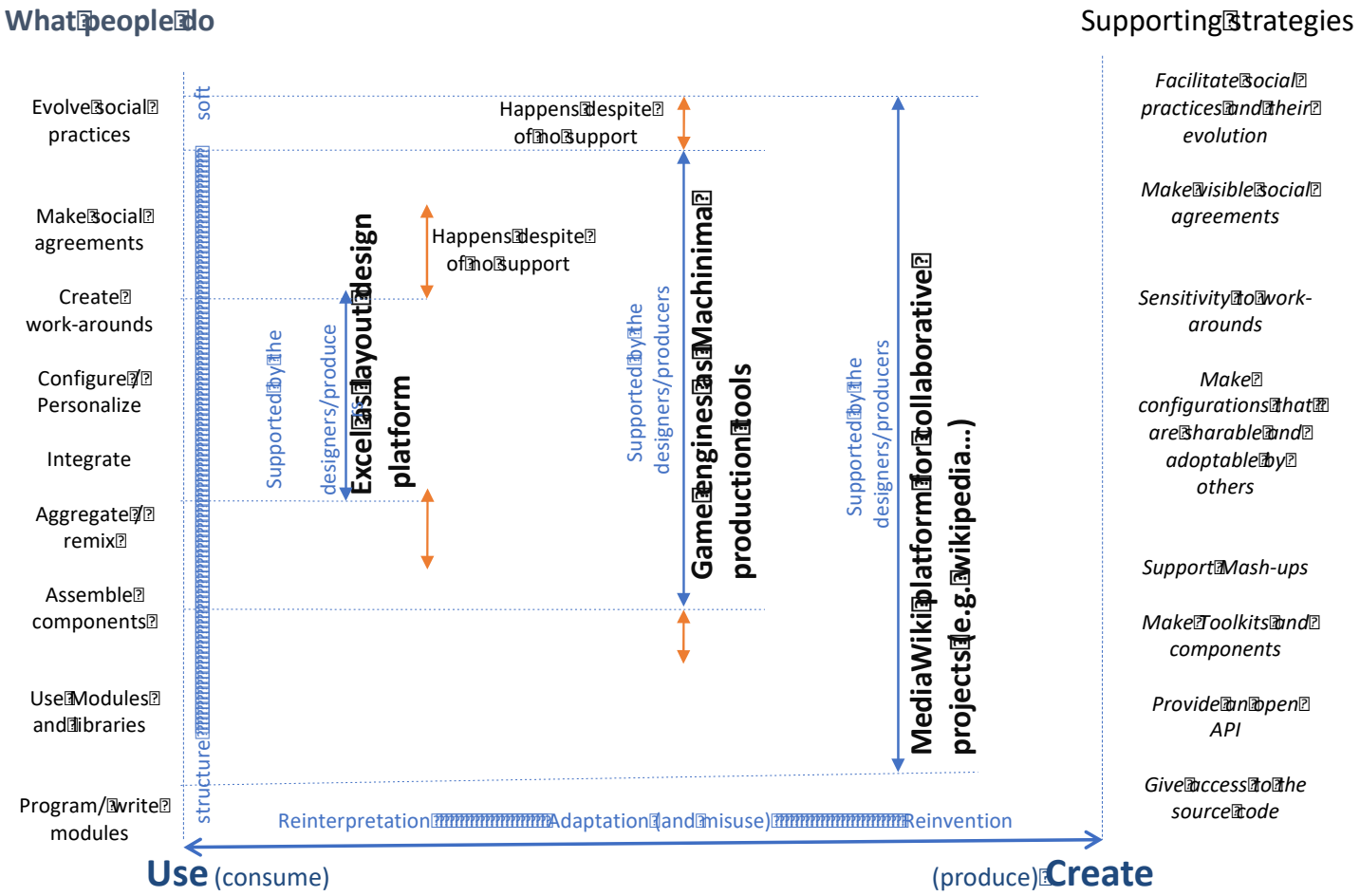


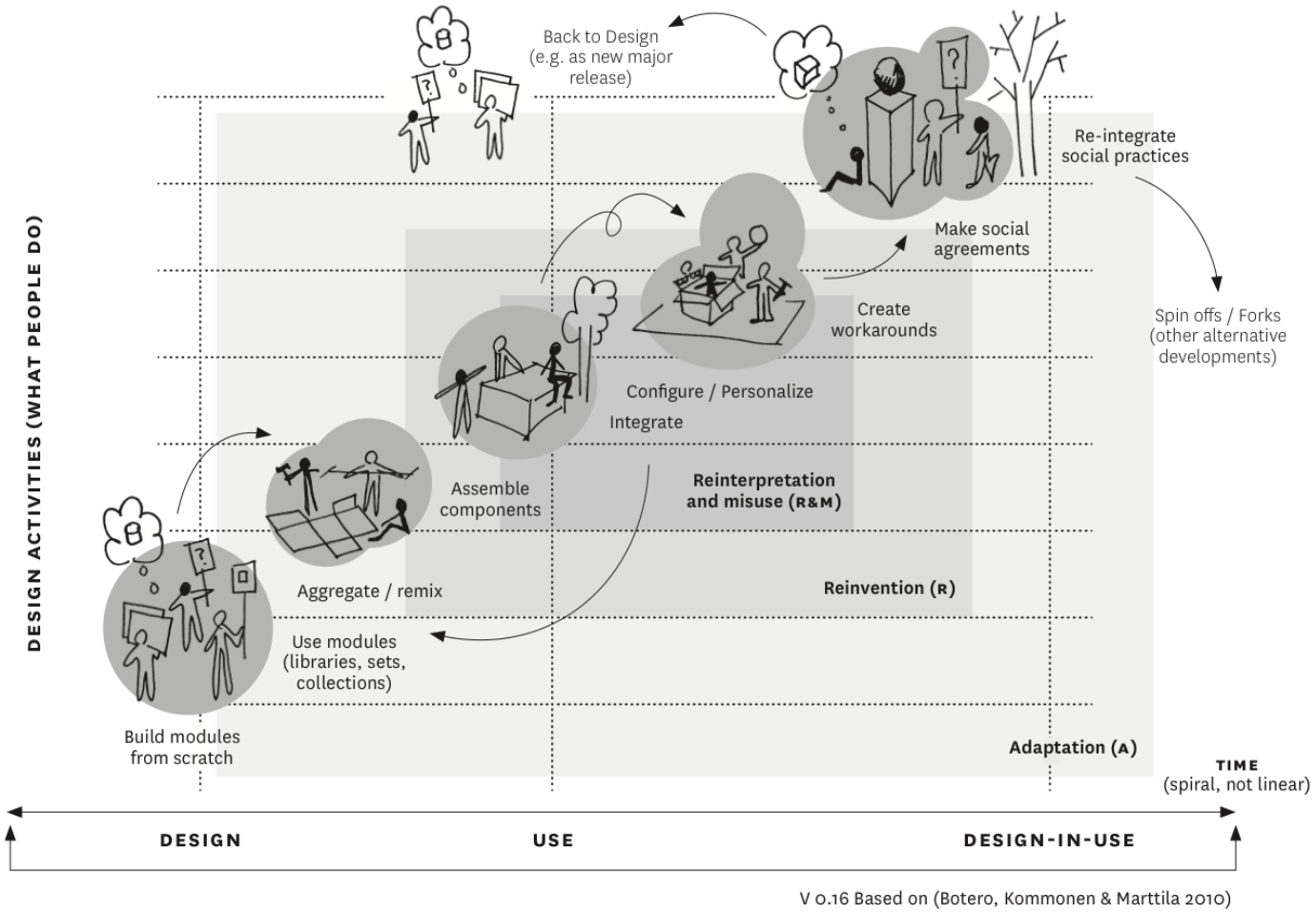
A minimal framework for discussing users' active design engagement: example of fablabs

Design Studies & STS & CHI:



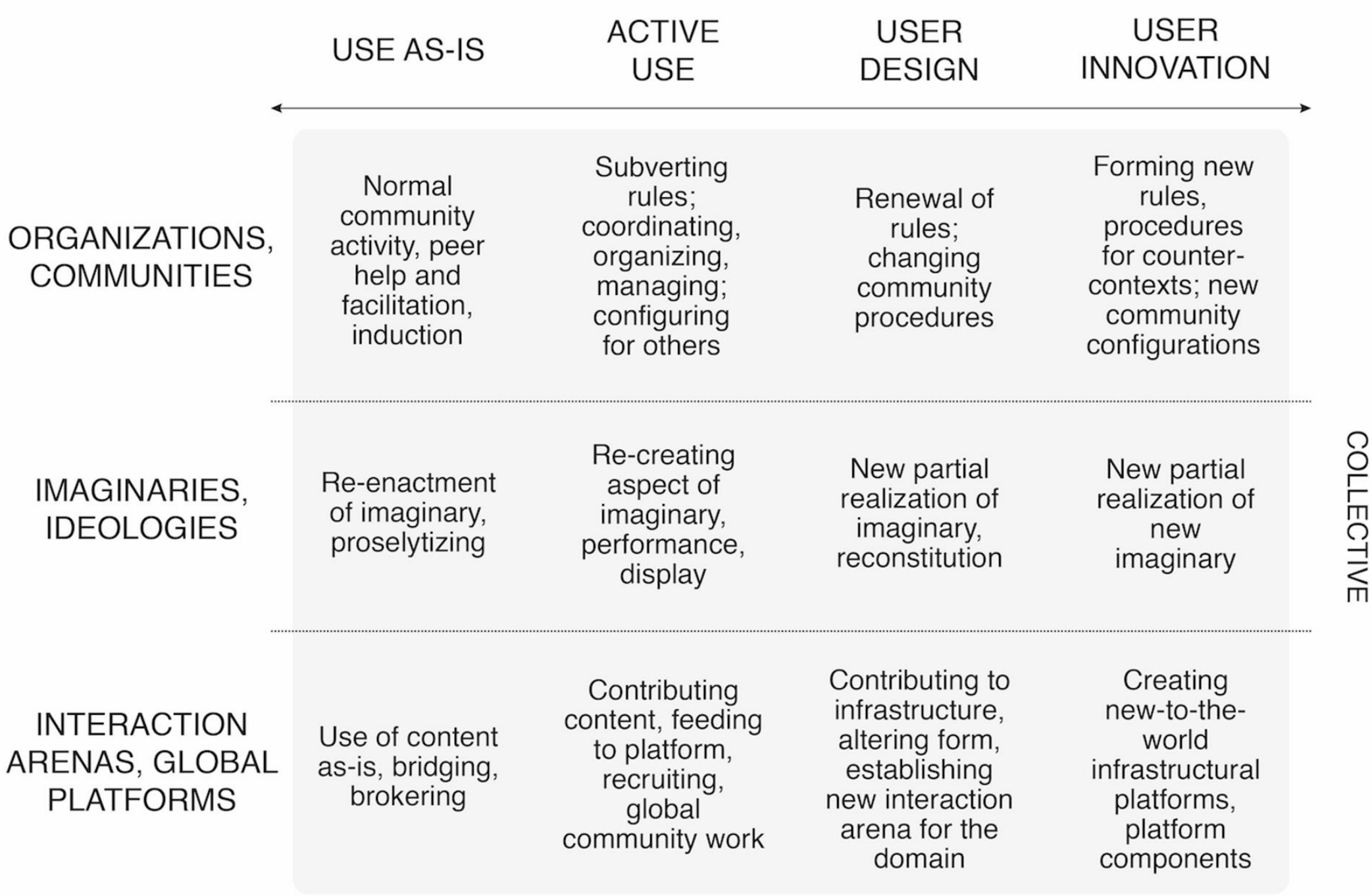
'Framework for a structure of the design space'. Source: Botero, Kommonen, Marttila. 2010.

Design Studies & CHI & STS:



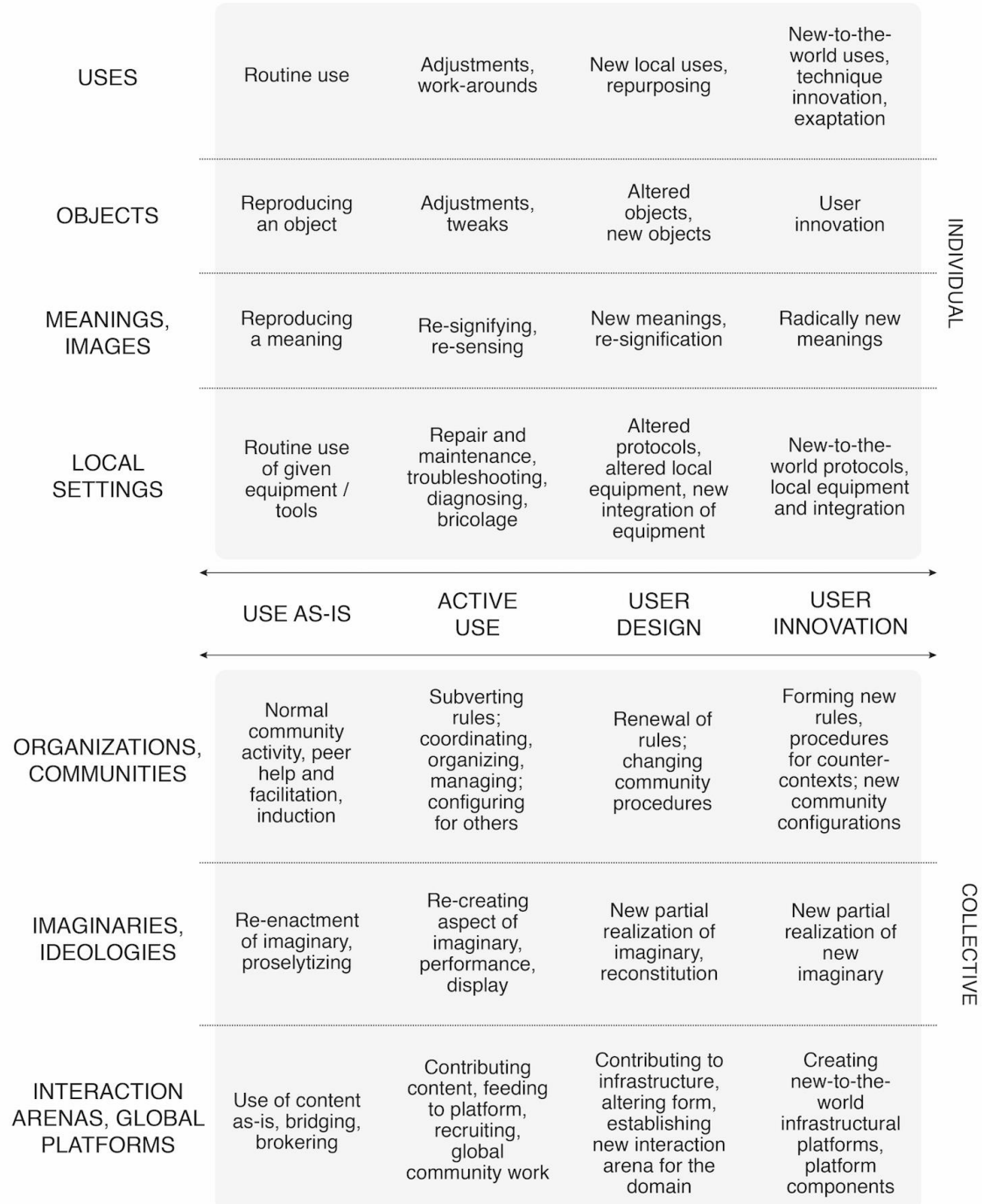
'Reinterpretation, adaptation, and reinvention in design spaces'. Source: Botero 2013: 93 (adapted from Botero et al. 2010).

FIELD	TYPOLOGY CATEGORIES, KEY REFERENTS	WHAT TYPES OF CATEGORIES ARE REPRESENTED	WHAT IS LEFT OUT
Design studies, Human-computer interaction, Consumption studies intersection	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
User innovation, Science & Technology Studies intersection	Local settings, interaction arenas, global platforms (van Abel, Evers, Klaassen, & Troxler, 2011; Johnson, 2013; Benkler, 2006) 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
Science & Technology Studies	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
ORGANIZATIONS, COMMUNITIES
Normal community activity, peer help and facilitation, induction
Subverting rules; coordinating, organizing, managing; configuring for others
Renewal of rules; changing community procedures
Forming new rules, procedures for counter-contexts; new community configurations
IMAGINARIES, IDEOLOGIES
Re-enactment of imaginary, proselytizing
Re-creating aspect of imaginary, performance, display
New partial realization of imaginary, reconstitution
New partial realization of new imaginary
INTERACTION ARENAS, GLOBAL PLATFORMS
Use of content as-is, bridging, brokering
Contributing content, feeding to platform, recruiting, global community work
Contributing to infrastructure, altering form, establishing new interaction arena for the domain
Creating new-to-the-world infrastructural platforms, platform components
COLLECTIVE

	USE AS-IS	ACTIVE USE	USER DESIGN	USER INNOVATION
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*
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*

COLLECTIVE


USES
Routine use
Adjustments, work-arounds
New local uses, repurposing
New-to-the-world uses, technique innovation, exaptation
OBJECTS
Reproducing an object
Adjustments, tweaks
Altered objects, new objects
User innovation
MEANINGS, IMAGES
Reproducing a meaning
Re-signifying, re-sensing
New meanings, re-signification
Radically new meanings
LOCAL SETTINGS
Routine use of given equipment / tools
Repair and maintenance, troubleshooting, diagnosing, bricolage
Altered protocols, altered local equipment, new integration of equipment
New-to-the-world protocols, local equipment and integration
INDIVIDUAL
USE AS-IS
ACTIVE USE
USER DESIGN
USER INNOVATION
ORGANIZATIONS, COMMUNITIES
Normal community activity, peer help and facilitation, induction
Subverting rules; coordinating, organizing, managing; configuring for others
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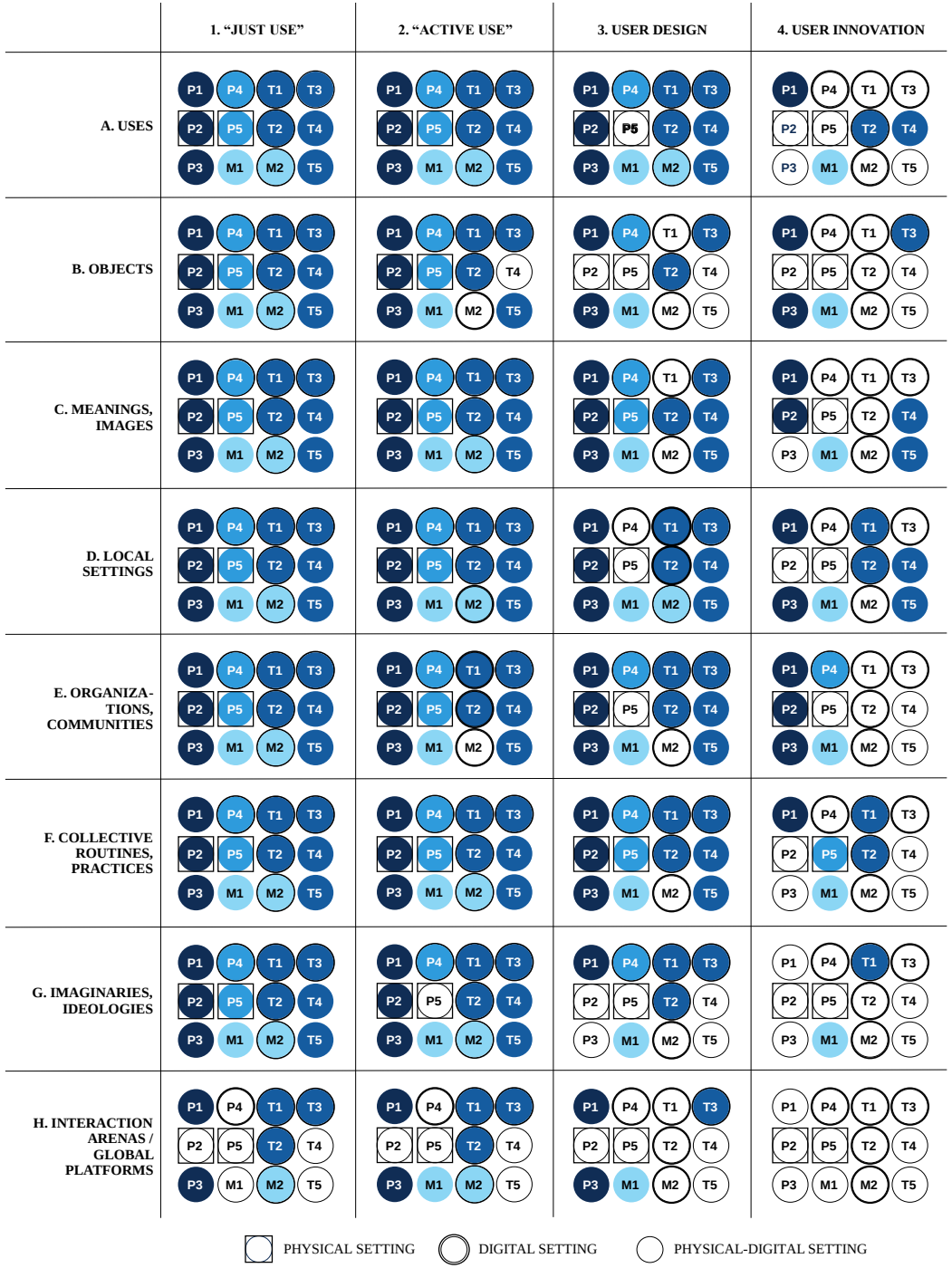
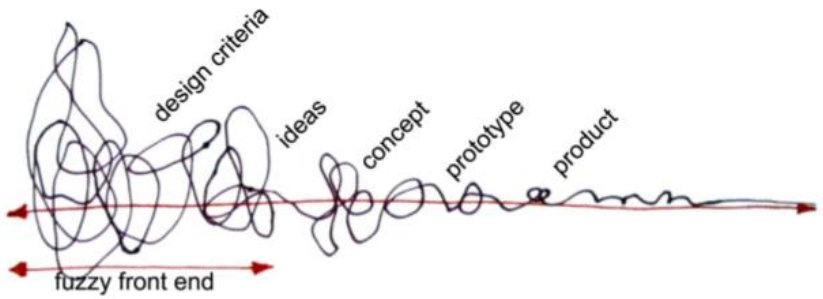
Creating new-to-the-world infrastructural platforms, platform components
COLLECTIVE

Sector	Sym-bol	Case name	Deep data	Case Descriptor and references	Settings	
					Digital	Physical
Peer-to-peer	P1	Remote terrain vehicles	●	Use and design of all-terrain vehicles, karakats in and for remote locations (Hyysalo and Usenyuk 2015; Usenyuk et al. 2016)	•	●
	P2	Community bicycle workshop	●	Peer-to-peer anarchist community bicycle workshop (Wu 2017)		●
	P3	Small-scale renewables	●	Small-scale renewable energy technology (heat-pumps, solar PV, Solar heat, Pellet burners) communities in Finland (Hyysalo et al. 2013a, b; 2016; Freeman 2016)	•	●
Academic co-design for peer-to-peer	P4	Digital solutions for the elderly		Co-realization of media solutions for active elderly residents (Botero 2013; Botero and Hyysalo 2013)	●	
	P5	Exploratory design initiatives		Peer engagement in designed community interventions on “plant hotels” (Wu 2017)		●
Private sector	T1	Healthcare packaged software	●	Software package for diabetes professionals and patients (Hyysalo 2010; Hyysalo and Lehenkari 2003)	●	
	T2	Teen social media	●	Digital service development of a large teenage virtual world (Johnson 2013; Johnson et al. 2010)	●	
	T3	Packaged enterprise software	●	Large packaged enterprise software package for higher education sector (Pollock and Williams 2008; Pollock and Hyysalo 2014; Johnson et al. 2014)	●	
	T4	Safety floor system	●	Healthcare safety system for the elderly developed in a living lab (Hakkarainen 2017; Hyysalo and Hakkarainen 2014)	●	●
	T5	Safety monitoring system	●	Healthcare wrist monitor safety system for the elderly (Hyysalo 2010)	●	●
Public sector	M1	Service network in Healthcare		New service network concept for home care in a city district (Soini et al. 2013; Hyvärinen, Lee, and Mattelmäki 2015)	•	●
	M2	Online platform for teachers and learners		Online platform for finding and utilizing high quality educational and audio-visual content (Hannukainen et al. 2017; Mäkinen et al. 2018a, b)	●	

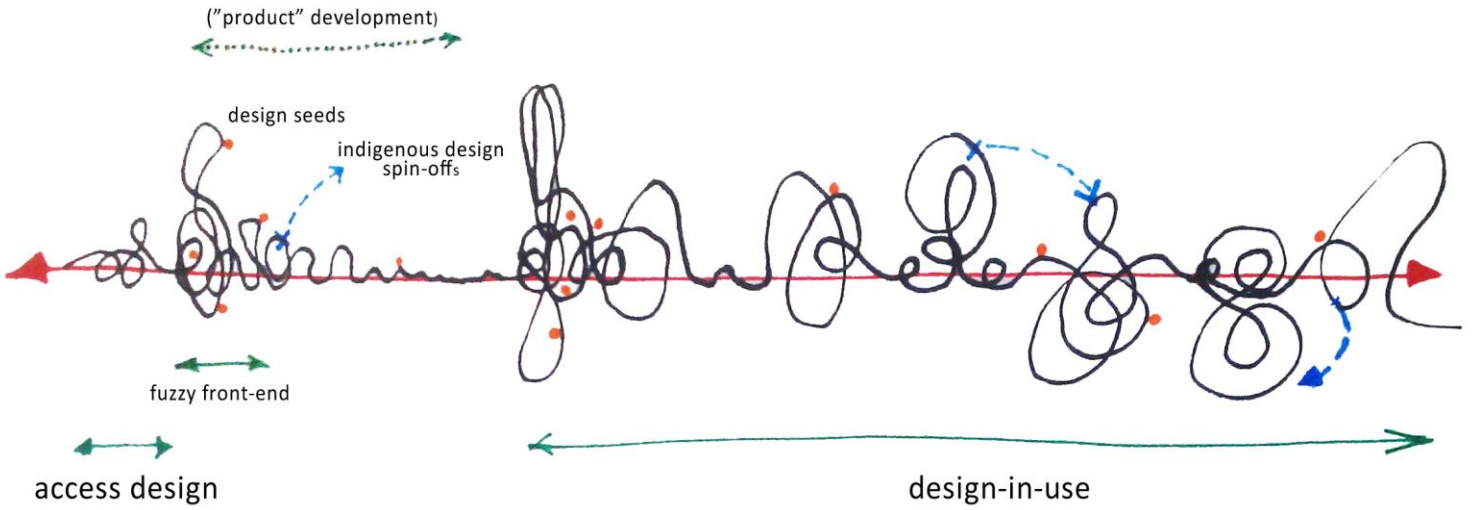


Implications and applications



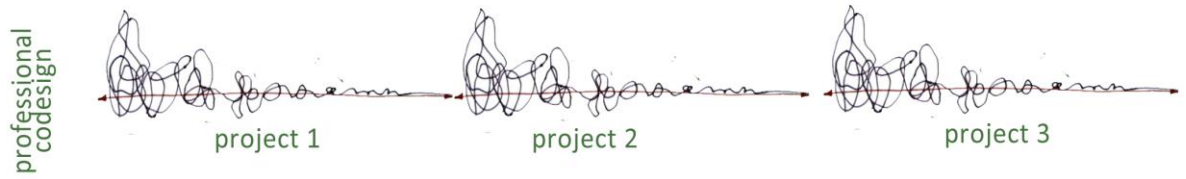
Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. CoDesign, 4(1), 5-18.

The upper image depicts typical collaborative product design process where interactions between designers and users (up and down twiggles) seize upon launch.

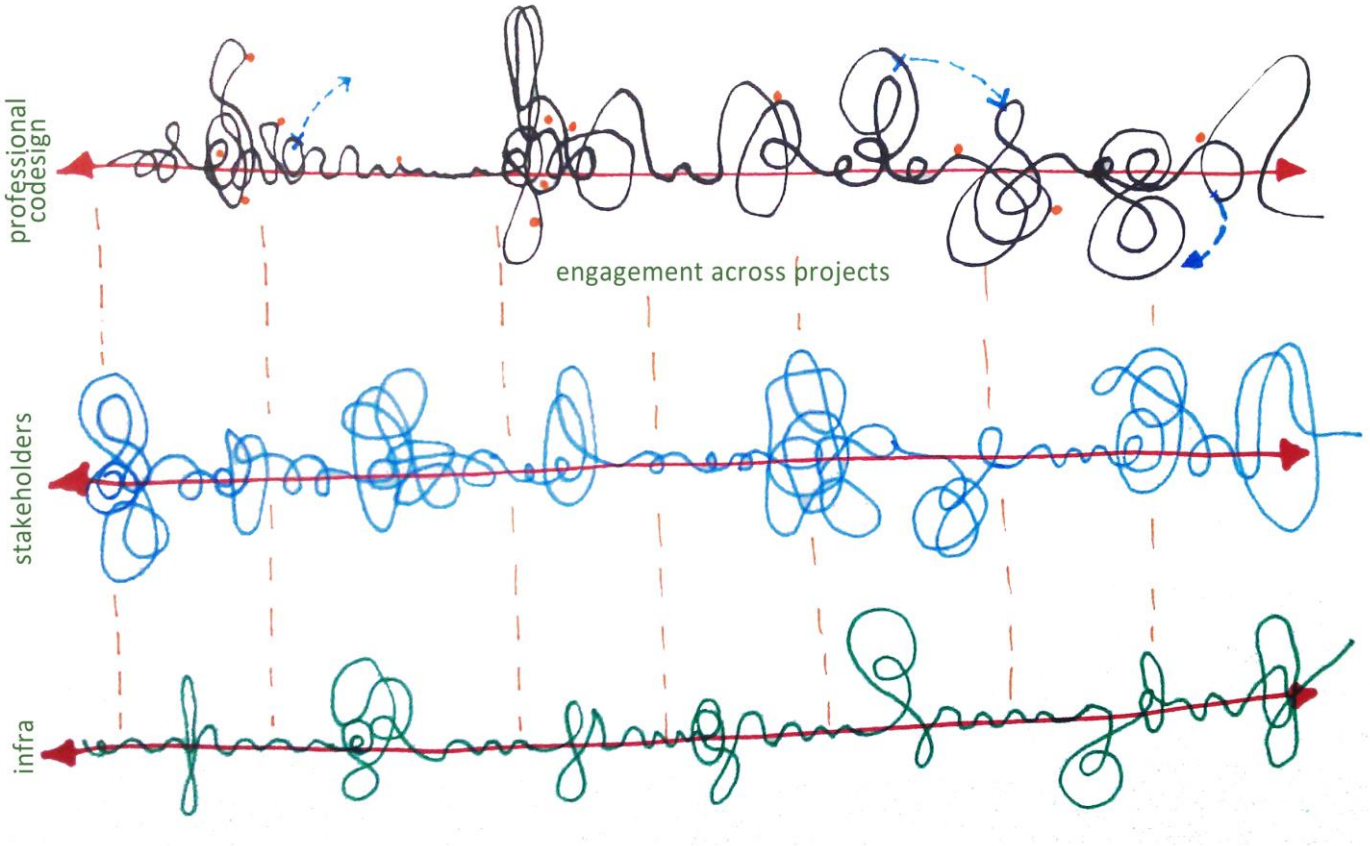


Lower image depicts design-in-use approach, where the initial launch is followed by heightened interactions and design iterations on flexible artichecture

Botero, A, & Hyysalo, S. 2013. "Ageing Together: Steps towards Evolutionary Co-Design in Everyday Practices." *CoDesign* 9 (1): 37–54 .



a) Fixed phase codesign: codesign long term engagement is a matter of repeating the same process a number of consecutive times.



b) Aging together codesign: codesign long term engagement in design-in-use requieres recognizing the trajectories and rythms of stakeholders' own projects and devising strategies to work with them

CoRealization,
Ageing Together,
Co-configuration,
MVP/MLP strategies

Premised on active use and designer and user design-in-use responses

Implicit but not explicit consideration of all active use dimensions

Botero, A., & Saad-Sulonen, J. (2023). Scalar trajectories in design: The case of DIY cloth face masks during the COVID-19 pandemic. Artifact: Journal of Design Practice, 9(1-2), 21.1-21.23. https://doi.org/10.1386/art_00021_1


HK MASK
M
HK MASK
M
EVERYMASK
EVERYMASK
Tie b
Tie c
Tie a
OK

USES	Routine use	Adjustment workarounds	New local uses repurposing	New-to-the world uses, technique, innovation
	Wear a DIY mask made by someone else	*Make a DIY mask fit better (tie a knot in the straps)*	*Combine other elements to improve fit (e.g. add nylon sock) or filtering (e.g. vacuum cleaner filter)*	*Use a rubber band to wear mask with hijab or turban*
OBJECTS	Reproducing an object	Adjustments, tweaks	Altered objects, new objects	User innovation
	Sew a DIY mask (at home)	*Make changes while sewing the DIY mask (e.g. create a pocket to insert filter)*	*Create a device to adapt DIY masks (e.g. a customisable extender)*	*Create a new DIY mask pattern with instructions*
MEANINGS, IMAGES	Reproducing a meaning	Re-signifying, re-sensing	New meanings, resignification	Radically new meanings
	Repurpose other textile items (e.g. T-shirts or socks) as DIY face masks		*Create an origami DIY mask pattern*	*Crochet a DIY statement mask*
LOCAL SETTINGS	Routine use of given equipment	Repair and maintenance, troubleshooting, diagnosing, bricolage	Altered protocols, altered equipment	New-to-the world local equipment and integration
	Use accessible sewing equipment (e.g. from library or a local sewing studio)	*Test best fit (e.g. use pipe cleaners for nose piece) and sealing (e.g. e-cigarette vapor)*	*Assemble DIY mask otherwise (e.g. use stapler instead of sewing machine)*	*Set up local distribution of DIY masks or patterns*
	USE AS-IS	**ACTIVE USE**	**USER DESIGN**	**USER INNOVATION**

INDIVIDUAL

	USE AS-IS	ACTIVE USE	USER DESIGN	USER INNOVATION
ORGANIZATIONS	Normal community activity, peer help	Subverting rules, coordinating, organizing	Renewal of rules, changing community procedures	Formation of new rules, procedures for counter contexts
COMMUNITIES	*Join a DIY mask collective (e.g. FB group*	*Create a DIY mask collective (e.g. FB group)*	*Transform rules of the collective*	*Create new rules for the collective*
IMAGINARIES, IDEOLOGIES	Re-enactment of imaginaries, proletizising	Recreating aspect of imaginary, performance, display	New partial realization of imaginary, reconstitution	Creating new to the world infrastructures, platforms
	Share info on how masks work and their benefits	*Create and share a repository (e.g. a list) of existing DIY face mask pattern*	*Make and share instruction videos of how to make DIY masks*	*Set up (a) distribution channel(s) for DIY mask patterns*
INTERACTION ARENAS, GLOBAL PLATFORMS	Use of content as-is, bridging, brokering	Contributing content, feeding to platforms	Contributing to infrastructure	Creating new-to-the-world infrastructural platforms
	Copy or download a DIY design/pattern from an existing platform	*Provide own DIY pattern or design adaptations back to the platform*	*Create an open editable repository of DIY mask designs/patterns*	*Create a new infrastructural platform for DIY mask designs*

COLLECTIVE

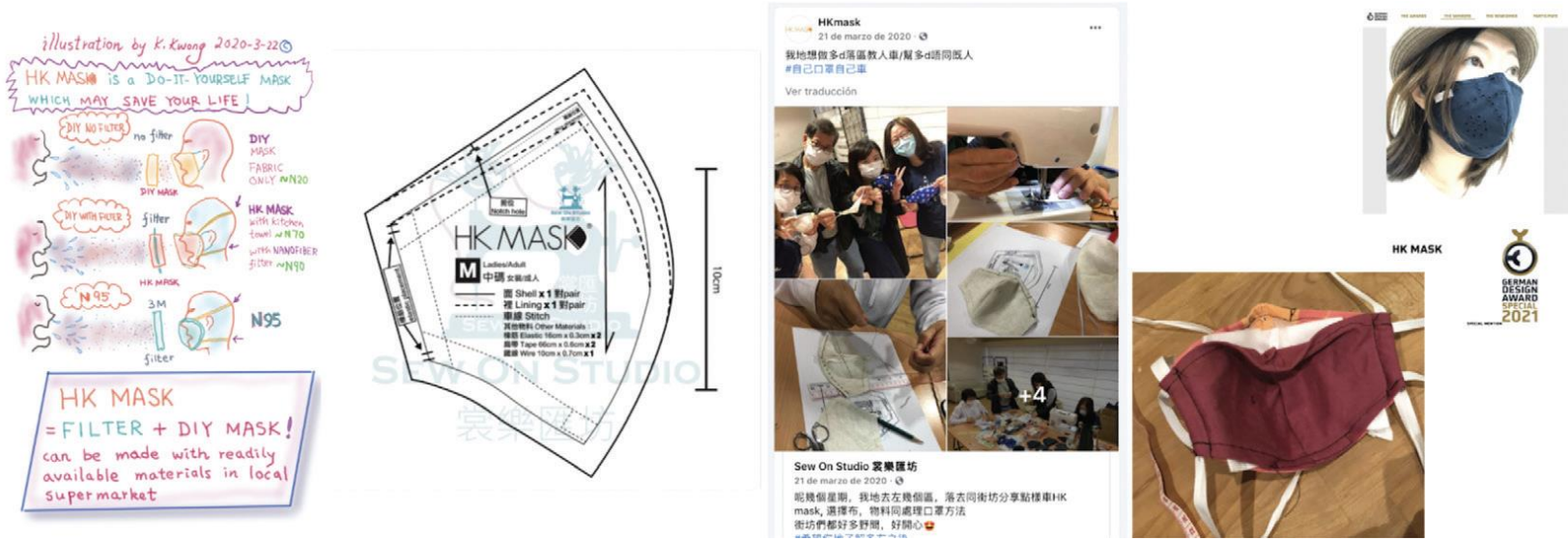
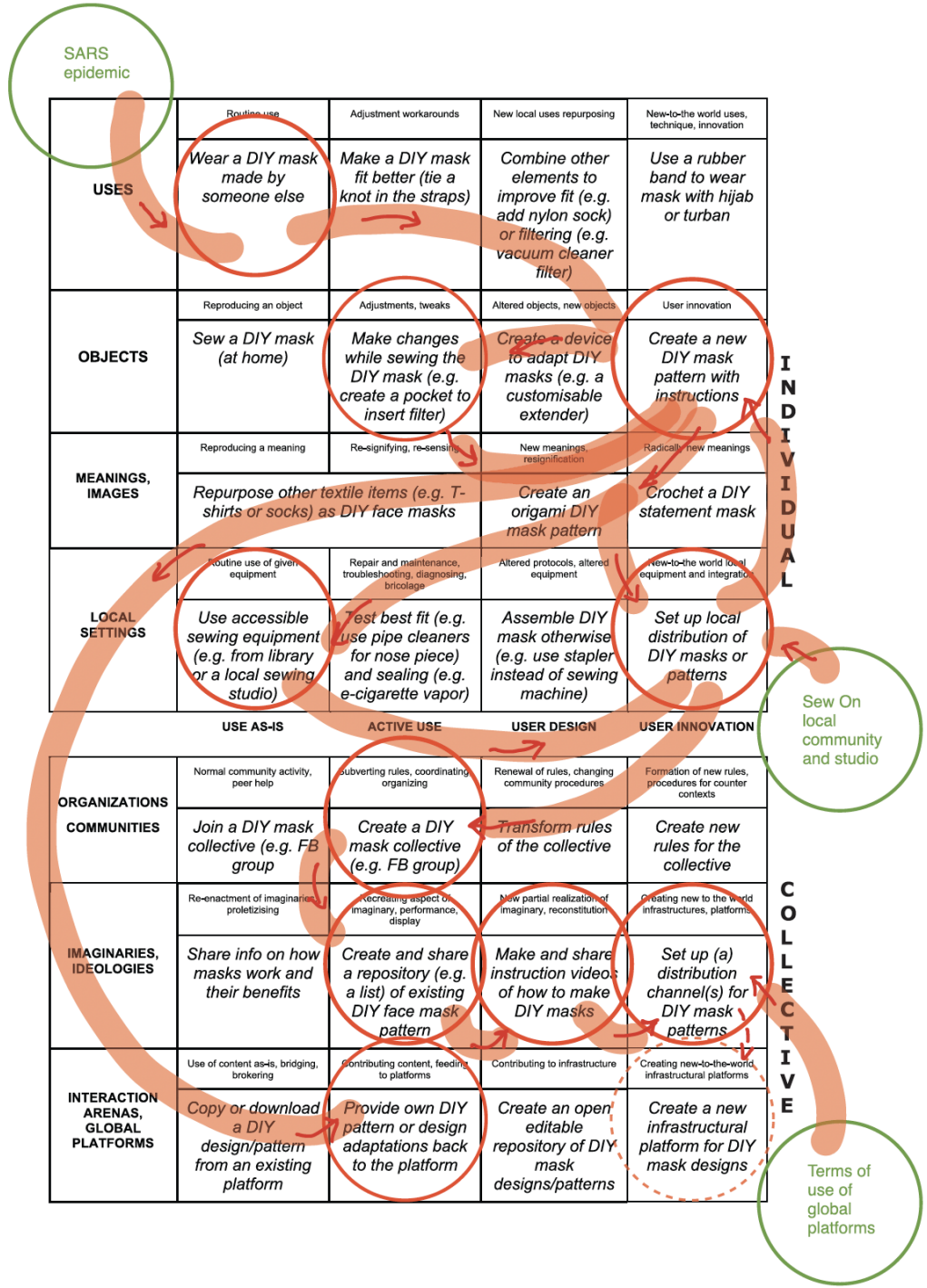
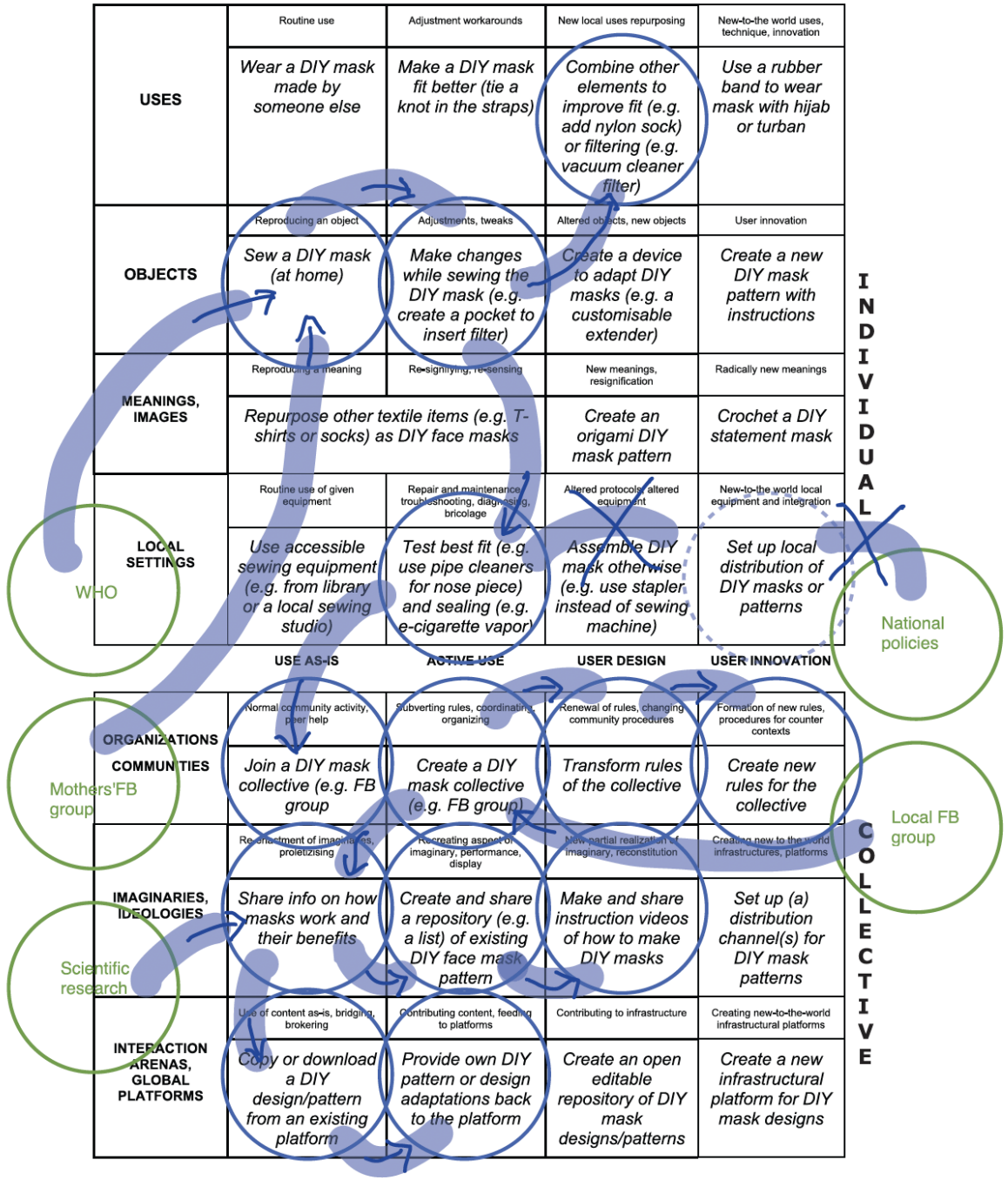


Figure 3: From left to right, the rationale for the HK mask as an illustration that Dr Kenneth Kwong created and shared via social media; a downloadable HK-mask pattern (in size M) for women, refined on the basis of his work and contributions from the Sew On Studio collective in Hong Kong; the HK-mask collective sharing a connection to a Sew On Studio community event through a social-media post in March 2020; the second author's HK-mask prototype made in Helsinki in the following month; a screenshot of the German Design Awards special mention from December 2021.


SARS epidemic
USES
OBJECTS
MEANINGS, IMAGES
LOCAL SETTINGS
Routine use
Adjustment workarounds
New local uses repurposing
New-to-the world uses, technique, innovation
Wear a DIY mask made by someone else
Make a DIY mask fit better (tie a knot in the straps)
Combine other elements to improve fit (e.g. add nylon sock) or filtering (e.g. vacuum cleaner filter)
Use a rubber band to wear mask with hijab or turban
Reproducing an object
Adjustments, tweaks
Altered objects, new objects
User innovation
Sew a DIY mask (at home)
Make changes while sewing the DIY mask (e.g. create a pocket to insert filter)
Create a device to adapt DIY masks (e.g. a customisable extender)
Create a new DIY mask pattern with instructions
Reproducing a meaning
Re-signifying, re-sensing
New meanings, resignification
Radically new meanings
Repurpose other textile items (e.g. T-shirts or socks) as DIY face masks
Create an origami DIY mask pattern
Crochet a DIY statement mask
Routine use of given equipment
Repair and maintenance, troubleshooting, diagnosing, bricolage
Altered protocols, altered equipment
New-to-the world local equipment and integration
Use accessible sewing equipment (e.g. from library or a local sewing studio)
Test best fit (e.g. use pipe cleaners for nose piece) and sealing (e.g. e-cigarette vapor)
Assemble DIY mask otherwise (e.g. use stapler instead of sewing machine)
Set up local distribution of DIY masks or patterns
USE AS-IS
ACTIVE USE
USER DESIGN
USER INNOVATION
INDIVIDUAL
Sew On local community and studio
ORGANIZATIONS COMMUNITIES
IMAGINARIES, IDEOLOGIES
INTERACTION ARENAS, GLOBAL PLATFORMS
Normal community activity, peer help
Subverting rules, coordinating, organizing
Renewal of rules, changing community procedures
Formation of new rules, procedures for counter contexts
Join a DIY mask collective (e.g. FB group
Create a DIY mask collective (e.g. FB group)
Transform rules of the collective
Create new rules for the collective
Re-enactment of imaginaries, proletizising
Recreating aspect of imaginary, performance, display
New partial realization of imaginary, reconstitution
Creating new to the world infrastructures, platforms
Share info on how masks work and their benefits
Create and share a repository (e.g. a list) of existing DIY face mask pattern
Make and share instruction videos of how to make DIY masks
Set up (a) distribution channel(s) for DIY mask patterns
Use of content as-is, bridging, brokering
Contributing content, feeding to platforms
Contributing to infrastructure
Creating new-to-the-world, infrastructural platforms
Copy or download a DIY design/pattern from an existing platform
Provide own DIY pattern or design adaptations back to the platform
Create an open editable repository of DIY mask designs/patterns
Create a new infrastructural platform for DIY mask designs
COLLECTIVE
Terms of use of global platforms


USES
Routine use
Wear a DIY mask made by someone else
Adjustment workarounds
Make a DIY mask fit better (tie a knot in the straps)
New local uses repurposing
Combine other elements to improve fit (e.g. add nylon sock) or filtering (e.g. vacuum cleaner filter)
New-to-the world uses, technique, innovation
Use a rubber band to wear mask with hijab or turban
OBJECTS
Reproducing an object
Sew a DIY mask (at home)
Adjustments, tweaks
Make changes while sewing the DIY mask (e.g. create a pocket to insert filter)
Altered objects, new objects
Create a device to adapt DIY masks (e.g. a customisable extender)
User innovation
Create a new DIY mask pattern with instructions
MEANINGS, IMAGES
Reproducing a meaning
Re-signifying, re-sensing
Repurpose other textile items (e.g. T-shirts or socks) as DIY face masks
New meanings, resignification
Create an origami DIY mask pattern
Radically new meanings
Crochet a DIY statement mask
LOCAL SETTINGS
Routine use of given equipment
Use accessible sewing equipment (e.g. from library or a local sewing studio)
Repair and maintenance, troubleshooting, diagnosing, bricolage
Test best fit (e.g. use pipe cleaners for nose piece) and sealing (e.g. e-cigarette vapor)
Altered protocols, altered equipment
Assemble DIY mask otherwise (e.g. use stapler instead of sewing machine)
New-to-the world local equipment and integration
Set up local distribution of DIY masks or patterns
USE AS-IS
ACTIVE USE
USER DESIGN
USER INNOVATION
INDIVIDUAL
ORGANIZATIONS
COMMUNITIES
Normal community activity, peer help
Join a DIY mask collective (e.g. FB group
Subverting rules, coordinating, organizing
Create a DIY mask collective (e.g. FB group)
Renewal of rules, changing community procedures
Transform rules of the collective
Formation of new rules, procedures for counter contexts
Create new rules for the collective
IMAGINARIES, IDEOLOGIES
Re-enactment of imaginaries, proletizising
Share info on how masks work and their benefits
Recreating aspect of imaginary, performance, display
Create and share a repository (e.g. a list) of existing DIY face mask pattern
New, partial realization of imaginary, reconstitution
Make and share instruction videos of how to make DIY masks
Creating new to the world infrastructures, platforms
Set up (a) distribution channel(s) for DIY mask patterns
INTERACTION ARENAS, GLOBAL PLATFORMS
Use of content as-is, bridging, brokering
Copy or download a DIY design/pattern from an existing platform
Contributing content, feeding to platforms
Provide own DIY pattern or design adaptations back to the platform
Contributing to infrastructure
Create an open editable repository of DIY mask designs/patterns
Creating new-to-the-world infrastructural platforms
Create a new infrastructural platform for DIY mask designs
COLLECTIVE
WHO
National policies
Mothers'FB group
Local FB group
Scientific research

Conclusions

Disciplinary oversight in recognizing the full scope of users active engagement:

- Not only an issue of estimating user innovation in objects and uses (technique, exaptation) but also in local settings, meanings, organizations… and how these interlink in peer collectives
- Active consumption, yes – but how much – to what depth?
- Rationale for extended-design-in-use ill-articulated in IS, CHI and Design

Active users in the 21st century:

– in a single domain (fablabs), we can see *all* dimensions and gradiations

– in design collectives (DIY facemasks) we can see how different forms of active use contribute to and enable the individual and collective endeavours

'First hand use' and interacting with 'objects' blend with 'sociological' topics, particularly with collective forms of active use: organizations, social practices, global platforms, imaginaries and ideologies, rules and regulations

… less frequently changed but not always reproduced either