Appendix

Developing the roadmap for human-machine networks for citizen participation

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This document is an appendix to the whitepaper on a roadmap for human-machine networks for citizen participation, presenting the background on which the roadmap was developed.

The roadmap has been developed in line with the HUMANE roadmapping process. Specifically, the development process covers:

- **Current technological situation, emerging and future trends**: which sets out the technical context in which the HUM operates;
- **Policy background and regulatory context**: describes the legal background to those HMNs;
- **Key challenges and goals**: the issues which face HMN stakeholders;
- **Suggested strategies and actions**: how to resolve those issues;
- **Overview of the roadmap**: what the resulting roadmap looks like;
- **Timeframe and prioritisation**: when and how the roadmap 'destination' may be reached;
- **Roadmap dissemination**: how the roadmap is shared with the wider community.

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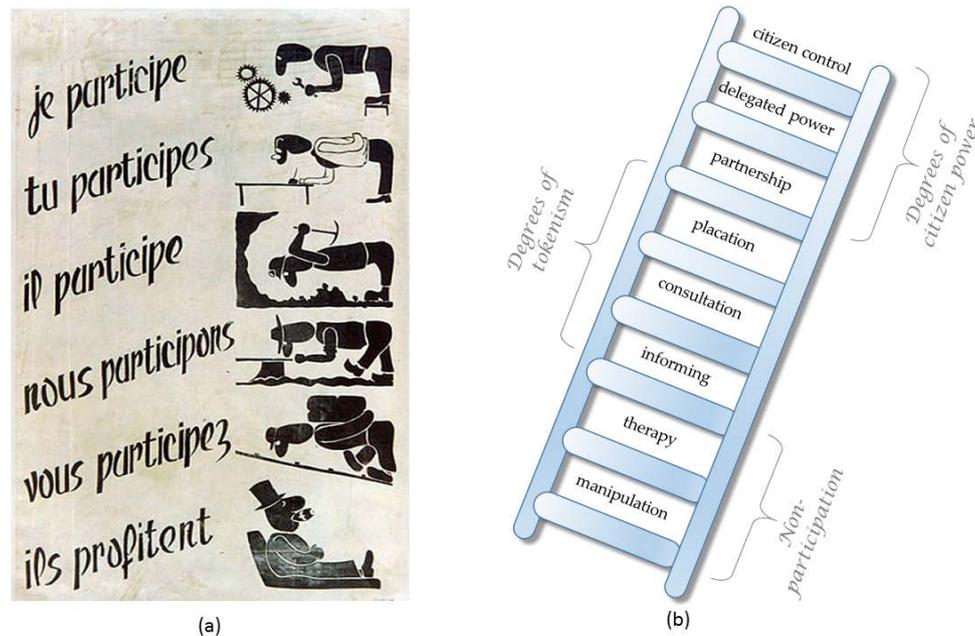
Figure 1: (a) the 1968 satirical representation of participation by the *Atelier populaire* (b) The Ladder of Citizen Participation (Arnstein, 1969)

The concept of *citizen participation* is not without controversy. As far back as (Arnstein, 1969), it was already well-established that there was something sinister and underhand about encouraging participation, summarised in a satirical poster from the *Atelier populaire de l'ex-École des beaux-arts*[1] (Figure 1 (a))*.* Arnstein elaborates by developing a ladder of participation running from non-participation associated with 'manipulation', through tokenism, to citizen power with 'partnership, delegated power and citizen control' (Figure 1 (b)). Her more nuanced interpretation has coloured much of the theoretical work in the area since, and at the very least provides a basis upon which to evaluate participatory networks.

Across the human-machine networks that we have reviewed and those we have studied in some detail, it is apparent that Arnstein has a point. Social networks, for instance, provide some form of 'therapeutic' outlet for many participants in developing and presenting a public persona to their would-be peers, whilst the more recent commercialisation of such networks may be said to 'manipulate' subscribers. Such manipulation includes recommender systems which seek to predict and influence potential future purchase decisions on the basis of what a consumer has already bought, and by highlighting what other, allegedly similar, consumers have purchased (Adomavicius & Tuzhilin, 2005). This manipulation may, however, be more insidious whereby search-engine results are filtered in accordance with monitored online activity (Fortunato, Flammini, Menczer, & Vespignani, 2006; Meiss, Menczer, Fortunato, Flammini, & Vespignani, 2008), thus presenting a consumer with only those results which they might have expected, or which align with a commercial or political agenda. These are at the level of *non-participation* according to Arnstein (*op.cit.*). Yet as the Arab Spring as

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[1] The accompanying image has been released into the Public Domain by the *Bibliothèque nationale de France*

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well as the London riots in 2011 demonstrate, there is significantly more potential for open exchange and inter-citizen interaction within such networks, which would conform to some extent with Arnstein's first level of participation through partnership. We note, however, that as social machines supporting social networking attract marketing and retail activity, for example through advertising alongside popular YouTube videos or targeted advertising derived from automated analysis of FaceBook exchanges, so the networks start to take on the characteristics of more complex socio-technical systems or actor networks. Nonetheless, these networks cannot be considered to be more than participatory, in the sense that they do not allow the users to climb Arnstein's ladder to achieve any level of delegated power or control. Where eDemocracy has been lauded in community, local or national contexts, the reality has been merely at the level of participation, where websites have been hosted to gather comment, or opinion has been garnered and analysed for sentiment drawn from twitter or FaceBook discussion. Whilst these might create the opportunity for citizens to feel that they are communicating with those in government, the reality is that the input from citizens has little direct effect on government decision making or policy. Influence is at best indirect, through coordinated direct action, such as seen in the grass-roots exchanges in riots or revolution, or through the combined weight of negative opinion circulating on social media and often amplified by national and international media outlets. But even in this case, there is a case to be made that this is in fact manipulation through social media of the people subscribing to it, rather than the users of social media driving opinion for themselves. In order that citizen participation moves up Arnstein's ladder to the highest rungs of delegated power and ultimately control, it will be necessary for those that currently exercise power to permit its delegation to the crowd, and for the crowd to be sufficiently representative of the population as a whole. This will necessitate the inclusion of checks and controls on the networked behaviour, exercised through the existence of machine agents within the network implementing moderation in a non-partisan way, and controlling the natural desire of individuals to dominate and direct those around them. Thus it can be seen that for citizen participation through networks to escalate up Arnstein's ladder, then those networks need to exhibit all the characteristics of human-machine networks, in which both the human and machine actors exhibit agency.

There have been two major updates since we first outlined the plans for a citizens' participation roadmap (Jaho et al., 2016; Jaho, Klitsi, Sarris, Følstad, Lech, Walland, et al., 2017): a number of elections and referenda have taken place with increasing reliance and concern about online technologies (Section 6.1); data protection with the EU has now been formalised into a general regulatory framework. We should now consider each of these and their potential effects on the roadmapping exercise for citizens' participation (Section 6.2).

1   Citizen participation HMNs: Current technological situation, emerging and future trends

For some time, there has been concern over Internet-based elections for the actual voting itself (Phillips & von Spakovsky, 2001; Springall et al., 2014). More recently, though, there have been

allegations of direct manipulation[2] or the threat of intervention[3]. This may have been manifest in the spreading of false information[4] as opposed to any direct vote rigging. But perhaps more worryingly are the indications of bot intervention during campaigns (Bessi & Ferrara, 2016; Chu, Gianvecchio, Wang, & Jajodia, 2010; Ford, Dubois, & Puschmann, 2016; Neff & Nagy, 2016). This could undermine participation and motivation, leaving the citizens' participation HMN with insufficient levels of engagement, or worse still, a one-sided and non-representative demographic, suspicious of the network itself and whether or not their views are being handled by an automated system or the democratically elected representative they are targeting as seen in other contexts (Barratt, Ferris, & Lenton, 2015).

As human and machine agency change in these networks, there is a need to think about what effects potential automation might have on user perspectives (Engen, Pickering, & Walland, 2016; A. Følstad, Engen, Haugstveit, & Pickering, 2017). At the same time, though, it's important to remember that individuals can and do adapt to online contexts. How their behaviours change may relate to role (Lai & Chen, 2014), or more subtle motivational and attitudinal factors (Grabner-Kräuter & Bitter, 2015). Being aware that information may be deliberately misleading is already the focus of research. It may, for instance, be possible to identify misinformation by appropriate technology (Conroy, Rubin, & Chen, 2015). More significantly, perhaps, it may equally come down to using social media – i.e., online communities themselves (Schifferes et al., 2014). The point is, networks need to be aware of and suitably handle the question of *provenance* and reliability. Communities themselves – that is HMNs – may prove adaptive here as well.

2 Policy background and regulatory context

In April, 2016, the General Data Protection Regulation (GDPR) was published (European Commission, 2016), and is set to replace the original 1995 Directive (European Commission, 1995) in May, 2018, across EU Member States. The regulation seeks to harmonise and simplify data protection requirements across Europe. For instance, there will only need to be a single Data Protection Authority (DPA) involved in any cross-border service or activity. Non-EU States, including Norway and Switzerland in Europe, possibly the UK at some later date, and the US, Canada and Japan, will all have to demonstrate compliance with the provisions of the regulation to be allowed to process and exchange personal data with EU Member States.

Of particular interest for citizens' participation is the right to be forgotten or the right to erasure[5] . This could help provide some protection for citizens who may not wish to be associated directly with the views they express. Providing a guarantee of anonymity in this way might encourage participation and motivate a more open and honest debate. This should be understood though in the context of Government control and alleged security[6] (see also Recital (16); L119/3 (European Commission,

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[2] http://www.newyorker.com/magazine/2017/03/06/trump-putin-and-the-new-cold-war
[3] http://www.foxnews.com/world/2017/04/20/france-concerned-over-russian-interference-in-elections-amid-reports-hacking-fake-news.html
[4] https://www.theguardian.com/media/2016/dec/18/what-is-fake-news-pizzagate
[5] Although see also https://humane2020.eu/2016/12/15/gdpr-the-right-to-be-forgotten/
[6] https://www.theguardian.com/uk/2011/aug/11/cameron-call-social-media-clampdown

2016)): if the Government decides that something is sensitive enough in terms of national security, then there is no protection for the individual. Regulation is therefore one-sided and does not encourage trust or shared responsibility for the network.

The other related concern, though, is that it is not always apparent who the other party is in a given interaction. This echoes what was highlighted in the previous section: how do I know if an interlocutor is a person, not a bot; and whether the information is real or 'fake news'? By contrast, there are times when individuals will use a cloak of anonymity for inappropriate purposes[7]; and individuals should surely have a right to make their own choices about who they share their information with across a shared community[8]. Empowerment and self-efficacy must be considered in balancing attempts at regulatory control (Pickering, Engen, & Walland, 2017). Regulation is therefore only part of the story when it comes to managing participatory networks and designing for long term engagement and commitment.

3   Key challenges and goals

In the context of the updates in the previous sections, we should now revisit the original constraints and focus on items we identified for the original set of stakeholders we identified in (Jaho, Klitsi, Sarris, Følstad, Lech, Walland, et al., 2017). The original characteristics we highlighted continue to be relevant and are reproduced in Table 1. However, and in light of the discussion above, we have added a new line: *provenance.*

	Local and National Government	Citizen Groups	NGOs	Industry	Security Services
Motivation	X	X			
Trust & Security	X	X	X	X	X
Control	X			X	
Accessibility	X	X			
Transparency	X	X	X	X	
Accountability	X			X	X
Regulation/legislation	X	X	X	X	X
Subversion	X	X		X	X
"Provenance"	X	X	X		X

Table 1: Constraints and issues for different stakeholders in citizens' participation

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[7] https://humane2020.eu/2017/01/24/cyberbullying-no-place-to-hide/
[8] https://humane2020.eu/2016/12/20/sensitive-data-cognitive-resource-and-my-community-extending-the-tie-strength-dimension/

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In addition to the provenance line which we return to in a moment, we have added Subversion as a factor for Citizen Groups themselves (see the highlighted cells in Table 1: the backgrounds are green; and the 'x' marks are in red). This reflects potential concerns that users may have that information is created and disseminated by bots. At the very least, this would distort perspectives. That aside, though clearly related to it, we identify provenance – where information or interactions originate from – as concerns for:

- *Local and national government*: if views do not reflect the citizens that the government agency seeks to represent, outcomes will not be representative or satisfactory to those citizens;
- *Citizen groups*: citizens may be influenced by incorrect or unrepresentative information; this could exacerbate any problems;
- *NGOs*: without assurance of where information comes from, NGOs cannot possibly represent suitable views; similarly, if it is unclear that interactions originate from actual citizens, this would cause the NGO to take action unnecessarily; and
- *Security services*: without knowing where information or interactions coming from, those responsible for security will not know whether a network is subject to attack or not, and whether corrective action needs to be taken.

All of this relates more specifically to behaviours and context around the HMN rather than any particular technical issues. Increasing machine agency will need to be managed sensitively, therefore, if the HMN is to evolve in ways that participants want.

4   Suggested strategies and actions

A number of specific conflicts have arisen as the roadmap has been developed. Such conflicts reflect issues related to stakeholder expectations and how these differ from stakeholder to stakeholder, to providing trust mechanisms, and to support motivation. To resolve these issues, the HUMANE typology and methodology provides a suitable set of design solutions which offer generic HMN-centric solutions not necessarily specific to citizens' participation networks. These are summarised below; the order is as they appear in (Asbjørn Følstad et al., 2016). The design solutions were separately validated and are grouped into specific areas: *Experience, Motivation, Reputation, Behavioural Change, Collaboration, Loyalty, Shared Responsibility, Social Interaction, Innovation and Improvement, Product Quality, Network Growth, Privacy* and *Trust,* shown in brackets along with the respective design solutions examined. The range of such categories reflects the fact that resolving potential conflict requires many different HMN-centric issues.

Provide what is desired, not just what is known (*Experience*)	This design solution is geared specifically towards ensuring that relevant information is provided and not just standard messages. As such, this would mean that participants would be given access to information related directed to any given interaction, i.e., the particular discussion that the individuals are engaged with. This might be expected to relate to **Trust** and **Motivation** as potential sources of conflict.

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Motivating users to contribute content in HMNs (*Motivation*)	This solution is aimed at making it easy for users to contribute and engage. Of course, this may be different depending on user category – e.g., whether the user is a citizen or policy maker. This obviously relates to conflicts between **Stakeholder Expectation**s, and suggests that all expectations need to be considered and designed for. Clearly, this will also have relevance to **Motivation**.
Reward users to keep them motivated (*Motivation*)	Gamification, for example, is often used to encourage participation. However, motivation may not simply be a product of 'badges': prosocial behaviours for instance are not necessarily motivated this way. It is therefore important that the reward be associated with the goals and expectations of users. For example, for citizens' participation, this might be providing direct access to policy makers for a specific discussion. This relates specifically to **Motivation**. However, if the reward includes appropriate transparency and information about the network and how it functions, this level of openness may promote **Trust**.
Strengthen social ties to keep users motivated (*Motivation*) **Preserving reputation of an individual, company or organization in HMNs** (*Reputation*) **Behavioural change through social motivation** (*Behavioural change*)	This group of design solutions relate specifically to exploiting the social nature of online interaction (see, for instance, (Kreiss, 2015)). Clearly, much can be learned from understanding social forces, including social identity and intergroup factors. This clearly relates to **Motivation**; but as social engagement also includes factors of **Trust**.
Collaboration between machines and humans through machine learning (*Collaboration*)	This may seem a surprising design solution. However, allowing AI techniques to identify patterns of behaviours or activity would provide valuable information which could be used by all participants in the network to understand each other's motives and drivers. This would help support issues of understanding **Stakeholder expectation**, and might encourage **Trust** and **Motivation** in consequence.
Apply loyalty ladder to build and maintain a sustainable user base (*Loyalty*)	This design solution relates back to *reward systems* outlined above. As such, it may support **Motivation** and **Trust**.
Encouraging shared responsibility HMNs (*Shared Responsibility*)	If participants can be encouraged to take ownership for the HMN, then this may be expected to contribute to the success of the network. In so doing, this would help **Motivation** and **Trust**. It may also help participants understand **Stakeholder expectation**, and may lead to increased participation.
Supporting social interaction through strengthening within-platform communication (*Social Interaction*)	This design solution relates back to the *social forces* mentioned above.

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Contributors learn to improve by being consumers first (*Innovation and Improvement*)	This design solution relates especially to *Stakeholder expectation*: allowing different participants to gain a perspective of other players in the network may encourage a better understanding and appreciation of those different players. As such, this may support *Trust* and *Motivation*.
Strengthen innovation through infrastructure for informal collaboration (*Innovation and Improvement*)	This design solution explicitly recognises that HMNs may develop in unexpected directions. However, designing for serendipitous interaction between participants at different times might encourage *Trust* at the very least, but also *Motivation*.
Employ automatic quality control (*Product quality*)	This relates back to machine learning and AI within the network. However, in respect to the quality of contributions (Loukis & Wimmer, 2012), having an automated system prompt participants to improve the quality of their input privately rather than publically across the network may encourage participation, i.e., relate to *Motivation*.
Protect new users for beginning (*Network growth*)	As above, allowing new users to find their own way, possibly even via making mistakes, then this may encourage *Motivation*, and possibly *Trust* in the network.
Managing privacy (*Privacy*)	This is an obvious design solution: participants need to know that their personal data *but also* their interactions are protected. This would support *Trust* as well as *Motivation*.
Strengthen trust through efficient handling at first point of contact (*Trust*)	Related to the *social forces* comments above, and obviously related to *Trust* and *Motivation*, these design solutions provide obvious support to the ongoing success of the HMN.
Strengthen interpersonal trust through rich profiles and recommendations (*Trust*)	
Supporting trust across HMN interactions (*Trust*)	

The HUMANE methodology offers helpful informative design solutions as described above. Derived from a set of HMN use cases which were not related to citizens' participation, this suggests that the design solutions are not specific to any particular type of HMN. Instead, they provide network-centric, rather than user-centric, solutions and patterns which resolve network level issues. In so doing, the HUMANE design solutions help finalise the roadmap creation as shown previously by providing solutions to possible conflicts which might otherwise mean that the challenges identified cannot be addressed.

5   Overview of the roadmap

In this section, we provide a high-level summary of the citizens' participation roadmap. The table highlights:

- **Implications associated with citizens' participation HMNs** (as identified in (Jaho et al., 2016))

- **Objectives of the roadmap**, as they relate to the overall goals (in Sections 6.1 and 7.3.2 of (Jaho, Klitsi, Følstad, et al., 2017)).
- **Actions needed to achieve those objectives** derived from the discussion above (and summarised under *Challenges* in the Citizen Participation roadmap itself; and
- **Design strategies** which will be expanded in the later subsections of this section.

For simplicity, the third column ("Actions needed to achieve the objectives") lists the challenges that relate specifically to the implications which we had previously identified (Jaho et al., 2016), shown in the first column. These need to be understood by those wanting to offer or operate such an HMN. So, the third column extends the implications we identified as they relate specifically to the roadmapping process for Citizen Participation. In the fourth and final column, the design strategies.

Implications associated with citizens' participation HMNs	Roadmap objectives	Actions needed to achieve the objectives	Related HUMANE design strategies[9]
Increasing human agency: this is mainly an opportunity for the network. Empowering participants may increase participation, but also demonstrate at first hand the citizens' participation HMN is worthwhile	Generate a culture of public engagement	**Understand the real role of technology, including regulation** **Manage motivation: how and why do people participate?** **Publicise outcomes: how to demonstrate that it's worth doing** **Manage trust: what encourages participations to trust others and the system** Addressing all of the challenges identified above will contribute to the promotion of a culture for public engagement. This is key to the ongoing success and sustainability of a citizens' participation HMN	- Provide what is desired, not just what is known[10] - Strengthen social ties to keep users motivated[11] - Apply loyalty ladder to build and maintain a sustainable user base[12] - Encouraging shared responsibility in HMNs[13] - Supporting social interaction through strengthening within-platform communication[14] - Contributors learn to improve by being consumers first[15] - Strengthen innovation through infrastructure

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[9] Note that section numbers refer to (Asbjørn Følstad et al., 2016).
[10] D2.2, 14.1.2.1
[11] D2.2, 14.1.4.4
[12] D2.2, 14.2.3.1
[13] D2.2, 14.2.4.1
[14] D2.2, 14.2.5.1
[15] D2.2, 14.3.1.1

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Implications associated with citizens' participation HMNs	Roadmap objectives	Actions needed to achieve the objectives	Related HUMANE design strategies[9]
			for informal collaboration[16]
	Deal with issues of trust	• **Understand the real role of technology, including regulation** • **Publicise outcomes: how to demonstrate that it's worth doing** • **Manage trust: what encourages participations to trust others and the system** Trust recurs as a challenge and must be addressed to facilitate take-up and motivation.	• Preserving reputation of an individual, company or organization in HMNs[17] • Protect new users from bouncing[18] • Managing privacy[19] • Strengthen trust through efficient handling at first point of contact[20] • Strengthen interpersonal trust through rich profiles and recommendations[21] • Supporting trust across HMN interactions[22]
Increasing machine agency: this is both an opportunity (in that increasing the power and sophistication of machine components will enhance overall HMN efficiency) as well as a risk (increasing machine agency may provoke suspicion among users)	Deal with issues of trust	• **Understand the real role of technology, including regulation** • **Publicise outcomes: how to demonstrate that it's worth doing** • **Manage trust: what encourages participations to trust others and the system** See above	• Employ automatic quality control[23] • Managing privacy**Error! Bookmark not defined.** • Strengthen trust through efficient handling at first point of contact**Error! Bookmark not defined.** • Supporting trust across HMN interactions**Error! Bookmark not defined.**
	Foster accountability	• **Publicise outcomes: how to demonstrate that it's worth doing**	• Provide what is desired, not just what is known**Error! Bookmark not defined.**

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[16] D2.2, 14.3.1.3
[17] D2.2, 14.1.5.1
[18] D2.2, 14.3.3.1
[19] D2.2, 14.4.1.2
[20] D2.2, 14.4.3.1
[21] D2.2, 14.4.3.2
[22] D2.2, 14.4.3.3
[23] D2.2, 14.3.2.2

Implications associated with citizens' participation HMNs	Roadmap objectives	Actions needed to achieve the objectives	Related HUMANE design strategies[9]
		• **Manage trust: what encourages participations to trust others and the system** Promoting transparency helps to encourage participation and ownership of the HMN. This will provide an impetus for the long term sustainability of the network.	• Collaboration between machines and humans through machine learning[24] • Encouraging shared responsibility in HMNs[Error! Bookmark not defined.] • Contributors learn to improve by being consumers first[Error! Bookmark not defined.]
Interactions: for citizens' participation to work effectively, interactions must be encouraged both in terms of how many interactions take place, but also with regard to the quality of those interactions	Create open and transparent debate	• **Manage motivation: how and why do people participate** • **Publicise outcomes: how to demonstrate that it's worth doing** • **Manage trust: what encourages participations to trust others and the system** See above. Once more promoting transparency and openness would be expected to encourage participation and debate.	• Reward users to keep them motivated[25] • Strengthen social ties to keep users motivated[Error! Bookmark not defined.] • Preserving reputation of an individual, company or organization in HMNs[Error! Bookmark not defined.] • Behavioural change through social motivation[26] • Encouraging shared responsibility in HMNs[Error! Bookmark not defined.] • Managing privacy[Error! Bookmark not defined.]
	Motivate engagement	• **Manage motivation: how and why do people participate** • **Publicise outcomes: how to demonstrate that it's worth doing**	• Motivating users to contribute content in HMNs[27] • Reward users to keep them motivated[Error! Bookmark not defined.]

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[24] D2.2, 14.2.2.4
[25] D2.2, 14.1.4.3
[26] D2.2, 14.2.1.2
[27] D2.2, 14.1.4.1

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Implications associated with citizens' participation HMNs	Roadmap objectives	Actions needed to achieve the objectives	Related HUMANE design strategies[9]
		• **Manage trust: what encourages participations to trust others and the system** See above. Motivation to participate will be encouraged if participants see value to what they do whilst their concerns for, e.g., privacy are removed or contained.	• Protect new users from bouncing[Error! Bookmark not defined.] • Supporting social interaction through strengthening within-platform communication[Error! Bookmark not defined.] • Employ automatic quality control[Error! Bookmark not defined.] • Protect new users from bouncing[Error! Bookmark not defined.] • Strengthen trust through efficient handling at the first point of contact[Error! Bookmark not defined.]
	Foster accountability	• **Publicise outcomes: how to demonstrate that it's worth doing** • **Manage trust: what encourages participations to trust others and the system** As well as encouraging responsibility (see above), trust may be increased along with transparency.	• Collaboration between machines and humans through machine learning[Error! Bookmark not defined.] • Encouraging shared responsibility in HMNs[Error! Bookmark not defined.] • Contributors learn to improve by being consumers first[Error! Bookmark not defined.]
Network extent: on one level (digital literacy and reach) this is a significant factor which could increase participation and HMN effectiveness. However, as demonstrated recently with	Deal with issues of trust	• **Understand the real role of technology, including regulation** • **Publicise outcomes: how to demonstrate that it's worth doing** • **Manage trust: what encourages participations to trust others and the system**	• Employ automatic quality control[Error! Bookmark not defined.] • Managing privacy[Error! Bookmark not defined.] • Strengthen trust through efficient handling at first point of contact[Error! Bookmark not defined.]

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Implications associated with citizens' participation HMNs	Roadmap objectives	Actions needed to achieve the objectives	Related HUMANE design strategies[9]
cyberattacks and accusations of inappropriate interventions in elections, there need to be safeguards in place to avoid a reduction in trust and engagement		This is especially relevant given recent events in the online social and political world.	• Supporting trust across HMN interactions[Error! Bookmark not defined.]

More information on these challenges and how they may be resolved can be found in (Jaho, Klitsi, Sarris, Følstad, Lech, Haugstveit, et al., 2017).

6 Timeframe and prioritization

Unlike other roadmaps, there is something both unique and critically context-dependent about any timeline associated with citizens' participation. This is summarised in Figure 2 below.
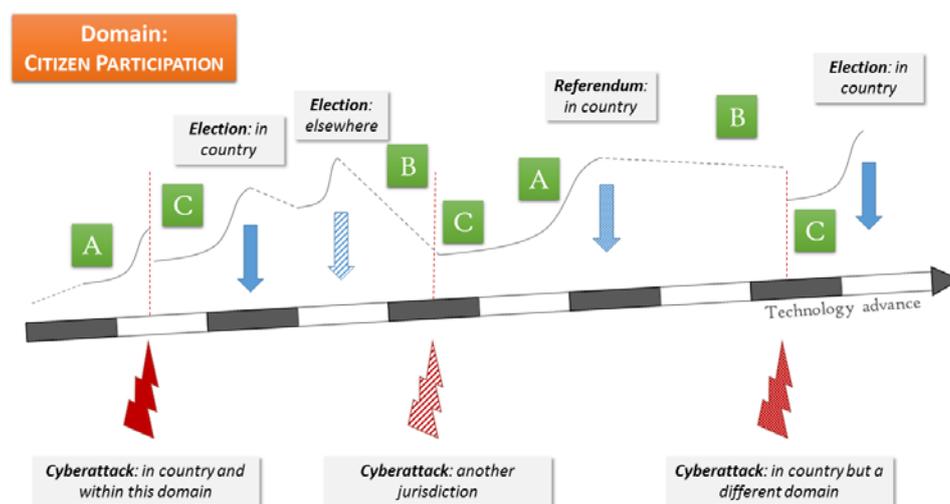

Figure 2: Context-dependent timeline for citizens' participation roadmapping

Although we would expect technology (and associated regulation) to improve and increase in power and complexity over time, there are different factors which will affect how citizens' participation develops over time. Not least given the update in (Jaho, Klitsi, Følstad, et al., 2017), we would expect technology adoption to be rather less linear. Especially in the run-up to an election of some sort (shown as "A" on the diagram), there may be expected *a priori* to be increased interest and participation. Note that elections may be in country (both local and national) and in which local citizens will be assumed to take part; or they may occur elsewhere, with citizens in one country

interested (or affected by) the outcomes of elections in other countries. Elections may also be parliamentary or presidential, involving a potential change in legislature, or to gauge public opinion which may influence the legislature and / or the executive, such as opinion polls associated with elections or referenda. Between elections (or referenda etc.), there may be a decrease in interest and engagement (shown as "B" on the diagram). However, in response to a specific external event, there may also be a sudden resetting of the level of citizen engagement ("C"): i.e., citizen participation reduces as citizens lose confidence in the process or the level of security. In Figure 2 we have taken the example of a cyberattack, since these typically result in widespread media coverage. In practice, though, this may be any event which exposes a vulnerability in a network or computer-mediated system. For example, this may be as simple as a doctor or MP losing a laptop or other device holding personal information about others. Any such event may include a simple breach of security, or a more subtle manipulation of information which may affect future decisions or events. As with elections and referenda, these may take place in country or abroad.

The evolution over time and in response to technological improvement may involve increased citizens' participation. However, this will not be a straight-forward progression towards any specific goal. Instead, there is likely to be a *quasi*-cyclical development which will be facilitated by inclusion of the HUMANE design strategies we outline above which were selected to address the specific HMN challenges we had identified in the preceding steps described in this section.

7   Roadmap dissemination

To complement this deliverable, we have also prepared a short white paper on the roadmap for citizens' participation HMNs. The white paper is intended to provide a quick and accessible overview of the roadmap to increase awareness among the target stakeholders. It provides a summary of the complete roadmap generation process as described in this chapter and the following specific to citizens' participation. In so doing, the white paper on citizens' participation HMNs works through the survey reported in (Klitsi, Jaho, Pickering, & Walland, 2017) and modified to provide greater and detailed relevance to the community associated with citizens' participation. Having discussed the results, and as outlined below, we use the HUMANE methodology to identify design strategies appropriate to addressing the challenges identified and which stand in the way of attaining the overall goals derived from interaction and discussion with stakeholders. As highlighted in the preceding sections in this chapter, the main issues relate to different expectations expressed by different stakeholder categories as well as trust and motivation. The latter two issues are not unique to citizens' participation HMNs.

As with the other roadmaps discussed here, the citizens' participation roadmap white paper will be published via the project website, made available via the Mendeley HUMANE group and the HUMANE social media channels. In addition, we will share the roadmap with the community approached to encourage input for the surveys reported previously (Klitsi et al., 2017).

8   References

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