

Design solutions for human-machine networks

Thank you for taking part. This survey was approved by the Faculty of Physical and Engineering Sciences, University of Southampton, ERGO Num: 23351

Imagine a network of people and technology, like sensors, mobile phones, laptops, tablets and servers, etc. Together, they engage in a common activity, like socialising via social networks, sharing knowledge via platforms like Wikipedia or Zooniverse, providing decision support for crisis management, online shopping or banking, education, and eHealth. There are many, many examples. Let's collectively call them Human-Machine Networks (HMNs).

We're interested in evaluating some of the potential design solutions to a set of problems we have identified for different Human Machine Networks and the behaviours associated with them. The problems and solutions are presented like this:

<To ensure xyz, TRY ABC>

Your responses will be used for scientific research purposes only as part of the HUMANE project. There are five different sections below, each with a few problems stated in simple terms along with a potential solution. All you need do is identify whether or not you believe the proposed design offers a possible solution to the problem as stated. At the end of each section, you will also have the opportunity - entirely voluntarily - to suggest solutions yourself.

We collect no personal data; and once you press "Submit" after all the suggestions, we will not be able to identify who answered.

NOTE: by agreeing to take part in this survey, you confirm that you are 18 years or older



Section 1. Motivations and experience

Issues in this section relate to **user motivation to participate and their experiences when taking part in a human-machine network**. This type of engagement between human actors can create a feeling of community or by word-of-mouth promoting the network to others and thereby encourage those actors to engage.

So in this section, we're looking at what gets people motivated to take part and engage with the network.

Please just indicate whether you *Strongly Agree*, *Agree*, *Disagree* or *Strongly Disagree* with the proposed design solution to the problem we've identified.

Question 1.1

To keep user-generated content being submitted, RUN REGULAR CAMPAIGNS TO REQUEST IT

To make sure that users respond as they should to warning signs and alerts, EXPLOIT ATTENTION-GRABBING DESIGNS

To make sure that users are aware of all content and materials available to them, USE RECOMMENDER FUNCTIONS

To protect users from being overwhelmed with too much content, USE CONTENT FILTERING BASED ON THEIR PREFERENCE SETTINGS

To maintain user engagement and participation, FOCUS ON CONTENT CONSUMER NEEDS AND EXPECTATIONS RATHER THAN THOSE OF THE PROVIDERS

To show that content aggregation and recommendation modules actually work, EXPOSE ANALYSIS OUTCOMES AND META-DESCRIPTIONS OF CONTENT TO USERS

To maintain user motivation in a loosely-structured network, DEVELOP A BADGING SYSTEM, POSSIBLY USER COMMUNITY CONTROLLER, TO REWARD USER PARTICIPATION

To maintain contributions in a network where there is little interaction, PROVIDE DISCUSSION FORA AS AN INTEGRAL PART OF CONTENT PLATFORMS

To provide transparent reputation indicators, ALLOW USERS, AND OTHERS, TO CHALLENGE REPUTATION ALGORITHM OUTCOMES

Question 1.2

Any comments? Or thoughts for better solutions?

Section 2. Behaviour and collaboation

Issues in this section relate to **user behaviour and collaboration when taking part in a human-machine network**. With suitable motivation and encouragement, human actors are more likely to participate and collaborate.

So in this section, we're looking at how to encourage participants to behave in ways beneficial to the network.

Please just indicate whether you *Strongly Agree*, *Agree*, *Disagree* or *Strongly Disagree* with the proposed design solution to the problem we've identified.

Question 2.1

To encourage behavioural change when there's little social interaction, MAKE BEHAVIOURAL CHANGE THE PRIMARY OBJECTIVE FOR INDIVIDUAL CONTRIBUTORS

To encourage behavioural change through social motivation, PUBLICISE THE BENEFITS OF CHANGE ACROSS THE WHOLE COMMUNITY

To encourage collaboration when there's little human interaction, INTRODUCE GAMIFICATION TO ENCOURAGE INDIVIDUALS TO ENGAGE AND BE WILLING TO COLLABORATE

To encourage collaboration across a highly distributed network, EXPLOIT GEOGRAPHIC LOCATION TO DISTRIBUTE TASKS, E.G., EXPLOIT DIFFERENT TIME ZONES TO ENSURE CONTINUOUS ACTIVITY

To encourage collaboration when social ties between human actors are weak, ORGANISE SOCIALLY FOCUSED EVENTS IN SUPPORT OF THE COMMUNITY

To manage conflict which could undermine the community, DEPLOY SPECIAL MACHINE NODES TO MONITOR FOR CONFLICT AND THEN RAISE ALERTS / WARNINGS

To encourage loyalty to the HMN, PROVIDE SPECIFIC BENEFITS ASSOCIATED WITH DIFFERENT DEGREES OF LOYALTY

To encourage human actors to take responsibility for the network, REQUIRE THAT ALL INTERESTED PARTIES PROVIDE FEEDBACK ON A STATE

BEFORE MOVING ON TO A NEW STATE

To control human-to-human interactions in the network, ENCOURAGE DIRECT COMMUNICATION VIA THE PLATFORM ITSELF RATHER THAN OTHER CHANNELS, INCLUDING INCENTIVES TO DO SO

Question 2.2

Any comments? Or thoughts for better solutions?

Section 3. Innovation and improvement

Issues in this section relate to **innovation and improvement as part of the activities of a human-machine network**. Encouraging human actors to engage in the HMN is one factor in promoting the long-term sustainability of that network; but the quality of the content they provide or the interactions that are enabled are also significant

So in this section, we're looking at how to maintain good quality input and engagement.

Please just indicate whether you *Strongly Agree*, *Agree*, *Disagree* or *Strongly Disagree* with the proposed design solution to the problem we've identified.

Question 3.1

To encourage quality content and input, MAKE IT EASY FOR CONSUMERS TO LEARN FROM THEIR OWN EXPERIENCES AND PREFERENCES BEFORE THEY GENERATE CONTENT THEMSELVES

To encourage quality input if users don't contribute very often, MAKE EXAMPLES OF SUCCESSFUL AND QUALITY CONTENT AVAILABLE AT ALL TIMES FOR ALL TO SEE AND USE

To facilitate innovation if there is a rigid culture in place, PROVIDE A CONTEXT OR AREA WHERE INDIVIDUALS CAN TEST THINGS OUT AND SHARE IDEAS BEFORE FINAL SUBMISSION TO THE NETWORK

To ensure the right user is assigned to the right task in line with their skill, if you can't ask them, DEVELOP USER-TO-TASK MATCHING ALGORITHMS BASED ON PROFILE(S) AND HISTORICAL PERFORMANCE

To maintain content quality if there are few controls over user contributions, EXPLOIT SECONDARY INFORMATION LIKE REPUTATION, 'VIEWINGS' AND PEER FEEDBACK TO IDENTIFY GOOD CONTRIBUTORS

To encourage new joiners to continue to participate if they feel intimidated by more experienced users, INTRODUCE A MENTOR SYSTEM WHERE EXPERIENCED USERS HELP AND SUPPORT NEW JOINERS

To cater for dynamic changes in network size, including growth as well as reduction, IMPLEMENT A SERVICE DIRECTORY TYPE APPROACH TO SUPPORT CHANGE.

Question 3.2

Any comments? Or thoughts for better solutions?

Section 4. Privacy and trust

Issues in this section relate to **Privacy and trust**: all other sections - like motivation, collaboration, innovation etc. - are predicated on a level of trust between humans in the network; under appropriate circumstances, such interpersonal trust may be transferred and applied to the machine components within a network

So in this section, we're looking at user perceptions of how they and their data are managed as well as machine reliability

Please just indicate whether you *Strongly Agree*, *Agree*, *Disagree* or *Strongly Disagree* with the proposed design solution to the problem we've identified.

Question 4.1

To prevent data privacy breaches, IMPLEMENT PRIVACY-BY-DESIGN FOR ALL DATA MANAGEMENT TASKS IN CONNECTION WITH STRICT AUTHENTICATION AND AUTHORISATION POLICIES

To maintain control over their data once it has been published online, OFFER SECURE, POLICY-BASED DATA CURTAIN SERVICES (A "DATA VAULT")

To streamline interconnectivity between different actors and different components within a network, USE PUBLIC-PRIVATE KEY TYPE ARCHITECTURES

For contributors to develop trust around the handling of their contributions, STRENGTHEN TRUST THROUGH EFFICIENT HANDLING AT FIRST POINT OF CONTACT

To establish trust between different contributors in a network, STRENGTHEN INTERPERSONAL TRUST THROUGH RICH PROFILES AND RECOMMENDATIONS

To make users aware of the benefits that their contributions have led to, DESIGN FOR COMMUNITY / NETWORK TRANSPARENCY: TURN ALL ONE-WAY INTERACTIONS INTO MULTI-DIRECTIONAL AS WELL AS MULTI-THREADED

To develop feedback mechanisms for crowd sourcing sites to help motivate them to continue to contribute, INCREASE TRANSPARENCY ABOUT PROCESSING DONE ON CONTRIBUTIONS

For terms around data privacy to be easily and readily understood by users so they can give informed consent, MAKE PRIVACY MANAGEMENT TRANSPARENCY, SO THE USER KNOWS WHAT HAPPENS TO THEIR AND OTHER USERS' DATA AT ALL TIMES

Question 4.2

Any comments? Or thoughts for better solutions?

Section 5. Underlying infrastructure

Issues in this section relate to the **underlying infrastructure** needed to support human-machine networks

So in this section, we're looking at the infrastructure itself

Please just indicate whether you *Strongly Agree*, *Agree*, *Disagree* or *Strongly Disagree* with the proposed design solution to the problem we've identified.

Question 5.1

To cater for continuous, fault tolerant operation, IMPLEMENT
AUTONOMOUS SELF-HEALING CAPABILITIES

To avoid performance degradation when network components fail,
IMPLEMENT MACHINE REDUNDANCY AND MIRROR FUNCTION
ACROSS NODES

Question 5.2

Any comments? Or thoughts for better solutions?

Thank you for taking this questionnaire.