The CANDID Template

Abbreviated version of the CANDID Primer

Including Social Sciences and Humanities (SSH) scholarship in the making and use of *smart* ICT technologies

(H2020-ICT-35-2016. Grant no. 732561)

The CANDID Primer is available online

The CANDID project has focused on *checking assumptions and promoting responsibility in 'smart' solutions to societal problems*. Centred on users, design, digital rights and critical infrastructures, CANDID has engaged SSH and ICT–LEIT[1] researchers, policy-makers, spokespersons for Civil Society Organisations (CSO) and other stakeholders, in 'extended peer communications' to identify pathways to collaboration across sectors in aiming for Responsible Research and Innovation (RRI).

Smart is a watchword typically used to mark recent shifts in technological development. The future shall be one of smart homes and healthcare, smart cities, energy grids and metering and, more generally, the fusion of everyday practices with the Internet of Things (IoT). While the term itself is becoming less frequent in policy and policy-related discourse, the predominant imaginaries depicting new-emerging ICTs and the user interactions with them still align with this depiction of the future.

Conceptual taxonomy of *smart*:

- *Smart* appears as an inventory of certain characteristics (digital, interactive, user-centred, etc.) and as pertaining to solutions in markets (phones, tablets, energy systems, home management, transportation, etc.).
- *Smart* refers to intersecting innovations and artefacts, e.g., the Internet of Things, RFIDs in networks, sensors in everything from household appliances to traffic controls, big data and algorithmic decision-making systems.
- *Smart* refers to the continuation of the *modernising project*, e.g., manifested in the *smart city*, where *smart* co-exist with the digitisation of city infrastructures and a focus on governance, services, *smart* regulation and law.
- *Smart* is a professional achievement/challenge/project taken on by various actors and networks involved in the making, distribution and use of *smart* solutions (lawyers, engineers, software engineers, users, etc.).
- *Smart* is data-driven agency which may threaten privacy, identity, autonomy, and legal rights such as non-discrimination, due process and the presumption of innocence. Data-driven solutions need responding to by change in legislation and regulation or by the engineering of rights into *smart* systems and services.
- *Smart* refers to shifting social and scientific relationships, introducing questions such as: Will smart tech make us stupid? Will we become more creative? Will smart machines take jobs from people? Will we see increased citizen science, do-it-yourself (DIY), peer-to-peer (P2P), co-production, and crowd-sourcing approaches, mobilising and activising citizens.
- *Smart refers to new forms of consumerism*. Advancements toward the smart society raise awareness of consumption and the aim of altering consumer behaviours with personalisation, a privatisation of politics and an appeal to aesthetics. A unique selling point of smart is the promise of making lives easier and more rewarding, of freeing people by embedding the means to solve everyday problems in the devices that surround them and are used, presumably, to make living less laborious. Smart is also

1 LEIT: Leadership in Enabling and Industrial Technologies

increasingly coupled with sustainability in the development of smart grids and metering and smarter manufacturing systems to better manage the means of consumption.

This document should be considered for self-reflection to foster the exchange of knowledge and experience. After extended peer communications, the CANDID team has proposed a development life-cycle that presupposes reiteration and reflexivity.

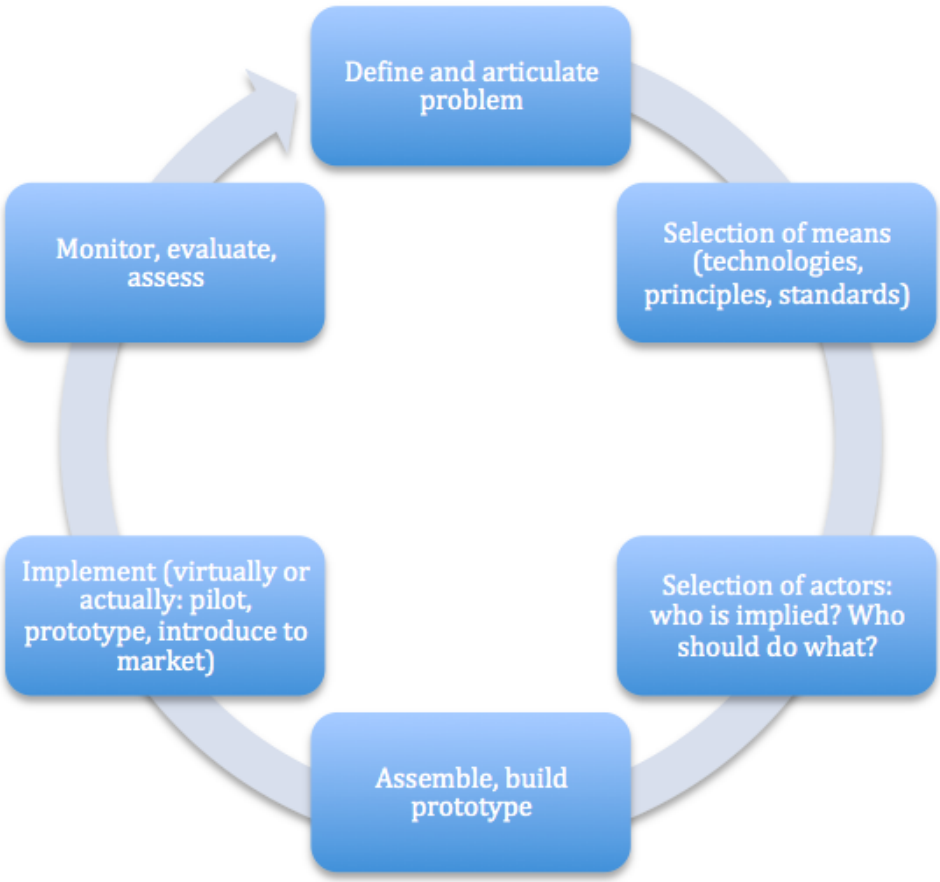


Fig. 1 Simplified presentation of a life cycle of technology development

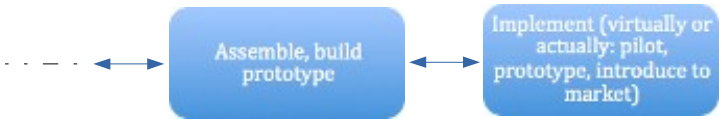
There are many sites on the trajectory from invention to innovation where problems are defined, articulated and evaluated, solutions proposed and implemented and the outcomes assessed. Variety of actors are involved in discussing and making choices about *common concerns*:

1. Agenda setting: programme committees, expert advisory bodies, research leadership.
2. ICT-driven research and innovation projects that operate to address societal challenges.
3. Innovation spaces (maker and hacker spaces, living labs, etc.).
4. Standardisation and regulatory bodies.
5. Impact assessments and evaluations: technology, innovation and policy
6. Public spaces and institutions (including courts), where the intersections of ICTs and society are debated and scrutinised.
7. Business and enterprise, focused on developing and marketing *smart* products, systems and services.

CANDID takes its cue from design and innovation studies, in thinking about innovation in a life-cycle perspective (Fig 1), through which innovation proceeds, is tried and tested in *recursive* and *reiterative* stages. Such a model works well for retrospective understanding rather than prospective forecasting. It does not present a linear trajectory and to avoid over-simplification, it should be stressed that the 6 stages overlap, are not exhaustive and must be creatively combined in reference to the work taking place in the different sites listed above. For example:

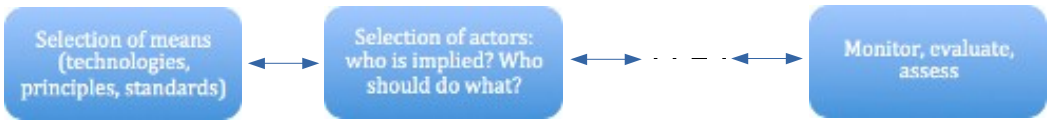
- Work in programme committees typically deal with defining and elaborating research and innovation agendas (*framing*), defining the appropriate means and even who some of the actors should be.
- Research and innovation projects may similarly deal with issue-framing and a selection of means, insofar as they propose solutions to problems that are already defined in research agendas (co-shaping the agenda).

- Research projects may focus on building something and proposing ways to bring prototypes to market.
- Typically, research projects are not concerned with post-project follow-up of the impact of products, so stages 4 or 5 may be where their scope of involvement comes to an end.



- Technology assessors and regulatory agencies have a responsibility of monitoring products and their impacts.

- Standardisation bodies may be concerned with selection of means and measures, even actors, in their work of assessing and evaluating a product, e.g., EC-authored templates for assessing data protection in RFIDs and in smart grid/metering applications.



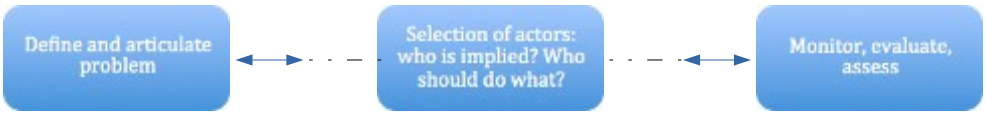
This model demonstrates how, ICT-saturated innovation involves *many hands* in and across the different stages through reiterations and, as is frequently the case, none of the actors possess a total overview so cannot be held accountable for the overall progress. Emerging societal and environmental implications may go unnoticed, especially in the early stages. Hence, a more inclusive practice is preferable right from the outset, to ensure societal robustness and acceptability. This preference is in keeping with the key goals of the RRI programme,[2] i.e., to increase reflexivity, responsiveness, anticipation and deliberation with respect to the infusion of societal, cultural, ethical, political and policy implications in ICT projects and environments.

2 The RRI programme has been embedded in ICT-related parts of the Horizon2020 Work Programme, https://ec.europa.eu/digital-single-market/en/responsible-research-and-innovation-ict-related-parts-h2020

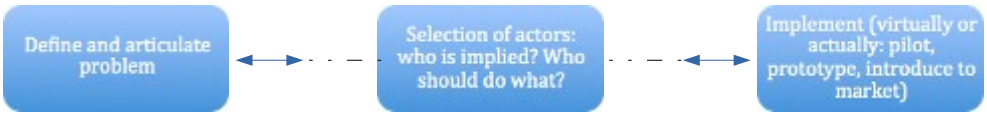
Key considerations in addressing the innovation cycle reflexively

Agendas and visions are not all-powerful. The networked and distributed character of many innovation projects means that all sorts of actors, not only those who define the research agendas, can co-shape the ways in which innovation agendas evolve and how (***Primer, Sections 2, 3, 4***).

- ***Assumptions**:* Has your team considered its taken-for-granted assumptions about society, culture, individuals, certain groups, citizens in general, disciplinary and knowledge hierarchies, and the everyday goings-on for which the innovation is supposedly purposed? For example, aiming solely to increase efficiency and productivity may introduce a whole host of new problems.
- Is your team trying to solve a technical or a social problem? According to the RRI programme, the best projects start with a well-constructed and adequately scrutinised societal concern rather than solely a technical challenge.
- What is the representation of women and ethnic minorities on your team? Design and engineering (also coding) are social activities in which culture, morals and prejudice are reflected. More diverse teams (gender, age, life experience) may define problems differently and suggest more accessible solutions.



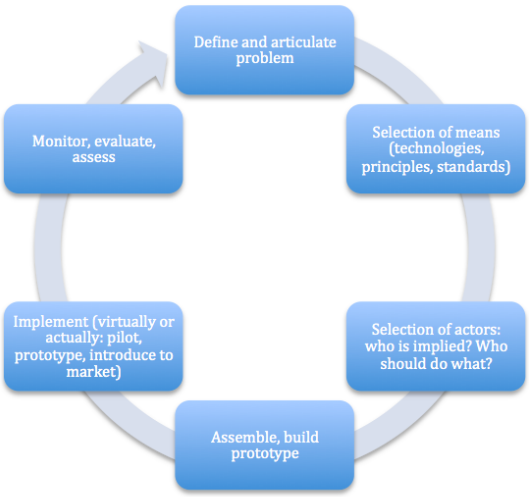
- Is your team familiar with the term *upstream engagement* and why/when such an engagement might be a good idea? (***Primer, Sections 2a, 4 and 7***).
- ***Inclusion/exclusion**:* Who are the individuals and groups depicted in your scenarios, and how are they depicted? Does your problem definition concern those who cannot exercise full citizen rights, have interests and needs that often go unnoticed (e.g., women, carers and domestic labourers), are significantly disadvantages or forced to rely on gatekeepers?
- Have you considered consulting civil society and non-governmental organisations (civil-rights, consumer organisations, privacy activists, etc.) ? Have you considered consulting citizen science initiatives?



- Is your team designing for societal or individual betterment and behavioural change? The current knowledge economy is driven to responsibilising citizens in addressing the societal challenges of the day. *Smart* solutions can be made to appear universally applicable anywhere, any time to anyone and anything, as off-the-shelf plug-and-play solutions ready to be deployed by anyone *in principle*. Yet, the ways in which *anyone* can use an application at *any time* and *anywhere* remains poorly specified and unaccounted for (***Primer, Sections 2b, 4 and 6***).
- ***User representation**:* Who are the *users* according to your team? Are they expected to take on a self-reliant role as co-producers, *prosumers* and active agents in managing, for instance, energy use and self-care? A networked user-driven market economy is distinctly characterised by a vision of innovation (and policy) moving users from passive to active roles, responsible for their life-style, consumption and ageing. Yet, user roles are commonly configured *in practice* to be much more passive than that, although, a variety of responses can be expected and observed when individuals come to adopt a technology in

real-life, either through their own will or due to mandatory policies as in the case of smart meters in several EU countries.

- Has your team considered people's ordinary impulses, instead of promising them efficacy, for example, their everyday habits, moral convictions, community norms and family traditions? (***Primer, Section 2c***).



Techno-regulation: Law and legal scholarships are relevant to all stages of the cycle. In ICT-saturated, distributed and networked environments, legal practitioners and scholars will enter into collaborations with users and technology developers, including those who process data on a big scale. This development has triggered debate about the role of law, especially how legal practitioners and researchers can intervene in the innovation practice at the earliest stages, for example, by assisting in the *hard-coding* of law (*speed bumps* and *barriers*) into ICT architectures and software design (***Primer, Section 2d***).

- Is your team aware that treating architectural and software design *in their practical mode* as equivalent to regulation, will endanger the very nature and practice of law, for instance, the use of case law for justifications, discretionary power and judgement in courts?
- Is your team considering the engineering tasks at stake in *rights engineering* such as privacy and data-protection by-design and default? There is significant degree of uncertainty about how to translate the legislative structuring of fundamental rights protection, which uses *polysemic concepts*, into technical and mathematical language, besides, the modalities which with rights are dealt with change over time.
- Is your team planning to collect personally identifiable information? Has the team assessed if this is necessary and *proportional* to the purpose at hand? Perhaps there is an alternative approach that does not rely on personally identifiable information. Such approach might actually be seen as more innovative and safer, especially in light of the 2018 EU General Data Protection Regulation.

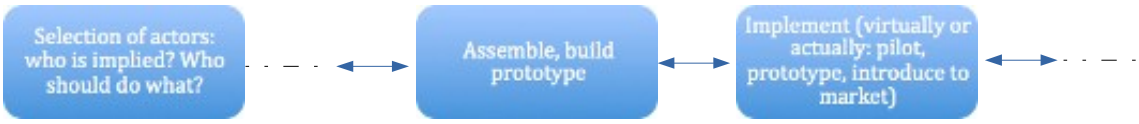
Selection of means: purpose and justification: Moral values and common principles can be instrumented to specify purposes and justifications for innovation, for example, as a progress and betterment, although, technology is typically the lead actor on the *inevitable* path to societal betterment. SSH scholarship can contribute here to the framing of human and societal goods that constitute the purpose of an innovation (***Primer, Sections 2 and 3***).

- Does your team explore cases where technologies have been developed for one purpose, then re-purposed with unintended consequences in contexts that were not openly pursued at the outset, or so-called *function creep?* [3] Does your team differentiate between *function creep* and a reflexive, responsive and anticipatory appropriation of the potential to *re-script* (and *de-script*) a feature or a function in ICT systems?
- Does your team recognise that your project might be promising future performance for which there is no guarantee, rather than a demonstrable capability? Innovation agendas are broad and open-ended to inspire and mobilise, risking to exacerbate tensions between actors with different stakes such as research leaders, entrepreneurs, policy makers, regulators, publics and privacy advocates (***Primer, Sections 2 and 3a***).

3 *Function creep* refers to new functions and purposes being revealed to unsuspecting publics and stakeholders.

- Does your team consider the elusive and open-ended nature of big data or their ambiguous and contested value? Does the team evaluate the nature and level of data-processing and analyses that take place before data are used to support some agenda (political, ideological)? (***Primer, Section 3b***).

Meaning-making with data: Simple operations are often amenable to automation, while complex operations on a multiplex of lifeworld problems and scenarios may not automate. SSH scholars can contribute to dis-entangling different situations and problems, not just by providing *additional information* about social life, but with problem frames and an understanding of meaning-making and the nature of common focal points. For example, *citizen scientists* in Barcelona (using sensors) could prove that decibel levels in a popular city square were frequently above the permitted limit, but policing the noise as a *simple matter of measure*, came up against SSH research showing that people vary considerably in terms of the irritation or anger *certain types* of noise can trigger while *other types* do not, i.e., regardless of whether or not decibel levels exceed a permitted limit.



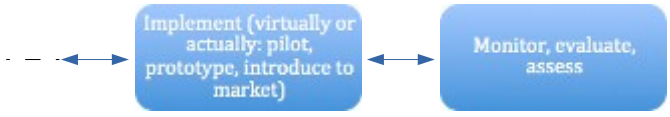
Extended peer reviews: If democracy is the starting point of *smart* developments, not algorithms and product design, then matters of inclusion, participation, public discussion, justice and expert intervention can be brought together to ensure that the stakes are adequately articulated, that expectations of citizens are realistic and rights and freedoms protected (***Primer, Section 4***).

- Does your team seek out occasions to include knowledge, values and interests that can be voiced in consultations? (***Primer, Sections 4a, 5 and 6***).
- How does your team identify and select stakeholder groups? How does your team identify citizens and select amongst them prospective users and relevant publics? How does your team identify and select scientific and engineering expertise?

Assemble and build: The designer is not an all-knowing person. ICT systems are frequently developed (and improved) directly in and through their use. Users are not uniform however, but varied and often involved in design and implementation by necessity (biometric passports) or *good practice*, for example, user-centred and participatory design, human-computer interaction and communications research (***Primer, Sections 5 and 6***)

- ***Interdisciplinarity**:* How symmetric are the relations your team has with SSH scholarship? Has the framing of societal problems alongside the engineering problems been a reiterative, recursive work, properly elaborated, collectively understood and appropriated throughout the innovation and development cycle?
- Is your team genuinely willing to collaborate across disciplines to see beyond their own focus and develop the potential of networked interdisciplinary environments?
- Does your team expect to measure against *grand ideas* and a promise of synthesised inter-disciplinary perspectives?
- Does your team consider the variation in the time scales disciplines and innovation practices work with? An ethnographer attempting to understand the lifeworld of a local community works on a time horizon which typically would not converge with that of an engineering project. Large-scale infrastructural projects can stretch over decades while the innovation cycles in agile software design are down to weeks or days.

***Implementing**:* SSH researchers have been developing strategies over decades to bridge between technological solutions, their users and usefulness in essentially societal settings.



More recent depictions of markets however, are based in individualist ideologies that develop alongside and are evaluated against the outcomes of user-centred and participatory design and human-computer interaction research (***Primer, Sections 6 and 7***).

- Does your team engage SSH scholarship to contribute in identifying the social sorting and profiling that individualised solutions, automated processing and decision-making can engender?

Assessing: The Science and Technology Options Assessment (STOA) agency is the pan-European institution of Technology Assessments (TA), while member states may also have national TA offices. Democratised and socially constructivist approaches have increased in Europe, shifting the course to more *up-stream* assessments, for example, so-called Constructive Technology Assessments (CTA) that are carried out in close proximity to all stages of research and development, especially the early stages (***Primer, Section 7***).

- Is your team planning to consult ELSA[4] researchers or the RRI programme to improve upon the institutional and agenda setting practices associated with your innovation and development project?
- Does your team consider targeting the whole innovation cycle for ongoing reiterative assessments?
- Is your team aware that all expertise operates on assumptions, models and ideologies that are essentially social and interpretative in their making? With innovation and design becoming near-ubiquitous, new opportunities emerge to critically engage users, publics and society at large, to which SSH researchers can contribute a dialogue on controversies and explorations.

Five key cross-cutting themes among key findings from CANDID communications

See also **http://candid.dataviz.xyz** , the online facility for data sharing and visualisation of discursive analyses

1. *Smart as a concept.* No single or unitary meaning can be ascribed to *smart* as a concept. Certain characteristics are prominent however, such as pervasive digitisation, miniaturisation of electronics, the ubiquity and integration of networks, sensors and actuators, the empowering of users, integrated services and a general orientation towards problem solving and design for everyday occupational, public and private practices. Yet, the primary role of using the concept appears to be rhetorical, political and policy oriented.
2. *Inclusion/exclusion.* There is a general lack of attention and sensitivity to the diversity of individuals, groups and communities, and the diversity of their interests, life choices, social attitudes and needs. Certain groups are labelled 'laggards' or 'late adopters', and some groups are ignored altogether in scenario-building and other visions of *smart* solutions.
3. *Role and quality of data*. Data are used for strategic purposes, even quite raw and inconclusive data. For example, there is inconclusive evidence that people actually change their habits by accessing smart metering data, yet the meters are already introduced on the basis of such an assumption. Bureaucrats incorporate data in their decisions, yet engineers may deem the data poor or inconclusive. Citizens use data for litigation purposes irrespective of their accuracy, and so on.
4. *Conflation of roles*. *Smart* solutions and services are typically promoted as user-centric and co-designed with users. Yet, in practice there is parallel tendency to construct citizens as passive agents who are merely the recipients of the societal good *smart* is thought to deliver. This also plays out in the legal field, where users as holders of rights (*data subjects*) are at the core of data

4 ELSA: Ethical Legal and Social Aspects

protection policies and regulations. Yet, in practice, it is hard to see how these *users* are represented or able to influence developments.

5. *Interdisciplinarity* is one of the current buzzwords, in reference to *smart* projects and technologies and innovation more generally for societal responsiveness and acceptance. Yet, in practice such collaborations struggle to live up to expectations. Difficulties arise when engineers and innovators are expected to collaborate with SSH scholars who are frequently seen by them as too critical. SSH and legal scholars will often remain outside the innovation practice rather than engage with it, but they may also feel that their unique methods and approaches require some distance. Engineers may likewise focus on their unique disciplinary contributions, for example, confined to improving algorithms in machine learning using experimental installations that reduce considerably any real-world social, cultural and interactional complexity. They will still make statements about societal purposes, for example, that the outcomes will support the ageing population, energy efficiency and security.