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Application of Human-Centred Design for Radical Innovations: the Case of Developing Design Criteria for Vertical Farming Vegetable Growth Units at Home.

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The transition from a linear to a circular economy can be expected to lead to the introduction of incremental and radical innovations. The value of a human-centred design approach for acceptance of technology and successful innovation is widely acknowledged (Brown, 2009) (Hippel, 2005) (Norman & Verganti, 2012). According to Giacomin (2014), an important element of this approach is to obtain understanding of needs, desires and experiences of the future users. In case of a radical innovation, which implies a discontinuity with the past (Garcia & Calantone, 2002), it is difficult to obtain this understanding since the users haven't had experience with the innovation yet. This makes it challenging to determine the desires and needs of future users in the front-end stage of the design process of a radical innovation.

Vertical farming, the production of food within the metropolitan area by deployment of light-emitting diode (LED) lights, climate control and other cultivating technology is an example of a radical innovation. It uses a new combination of technologies and can evoke a disruptive change in the established food supply chain; it can contribute to a more circular economy by closing cycles in the local food supply chain (Despommier & Ellingsen, 2008).

This paper elaborates on the identification of the desires and needs of future consumers that will use vertical farming vegetable growth units at home. The research question posed is 'What are design criteria for a vertical farming vegetable growth unit for use in the home environment, based on the desires and needs of the future user?' Topics that are addressed in the research are based on the Technology Acceptance Model (Davis, 1989).

A qualitative research approach, comprised by semi-structured interviews with 25 respondents about vertical farming at home and a questionnaire to elicit the personal profile was used. Participants were recruited and interviewed at three different semi-public spaces in the city of Amsterdam. The interviews are transcribed and the resulting qualitative data will be coded and qualitatively analysed in the months April-June 2016.

Preliminary results indicate that the majority of the participants show interest in a vertical farming unit for home use, but not so much for being a possible alternative source of food supply. Their interest is based on the educational value of growing food at home or for the fun factor experienced during the growing process itself. Criteria for a home vertical farming production unit seem to be mostly related to the level of autonomy that a system reaches and the dimensions of the product in relationship to the amount of edible produce.

This paper contributes to theory about designing radically innovative consumer products, since it gives an example on how to formulate design criteria that are based on an early stage evaluation of the desires and needs of future users. Content specific, it contributes to a human-centred design process of vertical farming home units that could enable a more circular lifestyle.