CASE STUDY 1
Part 1: Bootstrapping some Citizens

A Case Study for the DAAI Paradigm

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Abstract

While the DAAI theory describes the general format of a theory dealing with engineering processes in general shall this text illustrate a possible case study applied to the phenomenon of cities, city-populations and their dynamics. It is intended to elaborate the model of a process which enables citizens to *understand* their situation and to be able to *explore possible future states* of their city. At the beginning of the writing of this text it is not clear yet how this has to be done.

1 Bootstrapping a Population

This case study No.1 deals with homo sapiens sub-populations which are organized as *citizens* associated with a certain *spatial region* of the *planet earth*. Talking about such a subject requires the usage of a *language* and the decision, which properties of the subject shall be mentioned *explicitly*. As one can know the output of the language description is depending from the *speaker*, his *perceptions*, his *understanding* as well as his different kinds of *interests* what he thinks what is *important* and therefore what he thinks should bespoken out or written down. The many books and papers written by human persons about the planet earth, the BIOM of the earth, about the homo sapiens population etc. show a great variety of aspects, topics, properties, relations and dynamics. At the same time it is clear that a speaker will *not speak* about things he *does not know*. Thus *not knowing* is a constituting factor of the world picture in the

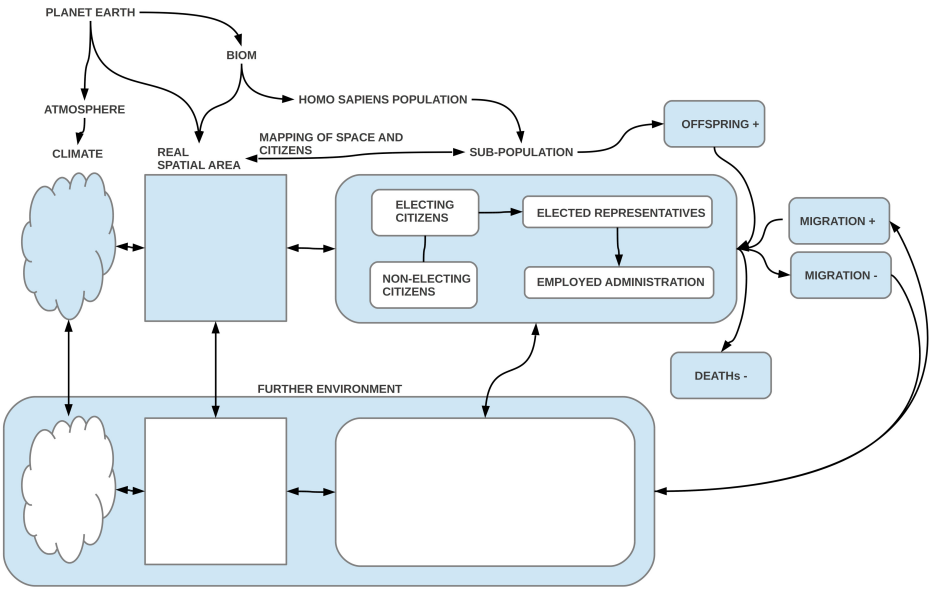

Figure 1: Bootstrapping a sub-population of citizens

same sense like the *available knowledge*. While *manifested* knowledge can be criticized whether it is *adequate ('true')* or *not adequate ('false')* with regard to the *real world*, the not knowing of subjects, properties or possibilities can not be perceived directly. From the history of ideas of the past millennia we know that human experience and science could reveal many important properties which are not easily visible at a first glance. Thus the way how homo sapiens is *dealing with the yet unknown* is an essential ability for the sake of survival.

Starting a text about homo sapiens sub-populations called citizens is therefore inevitably an arbitrary endeavor. Whatever the author of such a text will write down, it will be a selection and depending from the universe of possible concerns or curiosities there will surely exist some aspects which are not contained in the actually written text. The only way to cope with this problem of *never being complete* is to say to the reader, that this text is an *arbitrary beginning* which can be *extended* and completed *if wanted* and if needed to describe that, what shall be described in this text.

The above figure 1 shows a proposal for a beginning in the talk about citizens. Whether this beginning is enough or has to be modified in the future is part of this writing.

The author of this text has several times in the past years tried to start this text, but every time he gave up because somehow the whole story was

not convincing. After the completion of the version 15.06.07 of the DAAI theory and after some reviews, especially the review of Nancy Leveson's article (2020)[Lev20][1] it became clear that a talk about possible citizen sub-populations has to provide all main parameters which will be important for the description.

In the figure 1 you can see the following parameters:

1. **Planet earth:** The primary point of reference for every sub-population is the planet earth as real basis for every kind of *biological life*, here called *BIOM* as the sum of everything. The *homo sapiens* population is a subset of the BIOM or – better – a *sub-population*.

2. **Areas, Climate:** The surface of the earth can be divided into *water* and the *land mass* and above this we have the *atmosphere*. As a dynamic phenomenon between surface of the earth and the atmosphere we have the *climate*.

3. **Citizens, Regions:** Until now there exists an association between certain sub-populations called citizens and some real region of the surface of the earth. This regions can be called towns, villages, cities, urban region, county, country or so.

4. **City Organization:** The author looks here to such kinds of citizens which are using *elections* to select some *city representatives* to manage some general needs of the city. These representatives can have several additional groups of *employed administrations* to support the work. Until today citizens are divided into those who have the *right to elect* and those, who don't. Usually this right is associated with a minimal *age* assuming that the age is corresponding to that kind of experience and knowledge which is necessary for being *able to elect in the right way*.

5. **Population Dynamics:** Due to the biological structure of the citizens they can generate some *offspring* and they can *die*. Furthermore if the *environment* of a population of citizens is not empty, then there exists the real possibility that some citizens *migrate away* or other citizens *migrate into* the city. These four factors constitute a *population dynamics* which induces steady changes into the population(s).[2]

[1] cf. `https://www.uffmm.org/wp-content/uploads/2019/06/review-leveson-2020-acm-yourSWwillNotKill.pdf`

[2] There is a fifth factor in population dynamics which is due to the property of *aging*: human persons are dynamical biological systems originating by birth from a first cell which during life

6. **Earth dynamics:** Between the surface of the earth, the atmosphere, the climate and the populations of citizens exists several kinds of dynamic relations which continuously are generating different kinds of effects/ events.

These parameters assumed as *main environment* provide some first set to begin with. But as soon as one then tries to declare a possible *problem* and a *vision* statement which induce some further analysis and then a *resulting model* one can detect, that *real* populations of the *real* earth are also heavily interacting with the *solar system*. Without e.g. the sun there is no life possible on earth. And taking this into account one can see further interactions of the solar system with the *milky way galaxy*, where the solar system is part of, and then the whole *universe*, where the milky way galaxy is part of.

Thus it makes some sense to assume a *general environment* for real processes which will be explained only *on demand*: if there is some need e.g. to explain all those phenomena on earth which are depending from the energy flow from the sun to the earth one has explicitly mention the sun as a parameter, and so.

Figure 2 shows an outline of such a *general environment*. Thus for the further analysis this general environment is assumed as a general framework always valid and all further special assumptions are presupposing this general environment.

2 Telling a Story

With these first general assumptions it seems we have the following scenario as our general starting point for real-world simulation games for cities:

1. We have a *group of citizens* from some city (or town or metropolitan area or ...) which want to *understand* their city better to detect *possible problems* and *possible visions* and – hopefully – being able, to compute some possible futures based on these assumptions.

2. Because the classification of something as a *problem* or a *vision* depends from the actual *understanding* of human persons associated with some

is growing, attracting certain structures and functionalities, showing a learning attitude during the whole life, and then after finitely many years the growing is changing slowly in the direction of 'degenerating'. At the end the organism will die. Correlated with this overall growing and aging one typically can distinguish certain *phases* in the life of human persons which are associated with typical functions in the population (being a child, a student, an adult, ...).

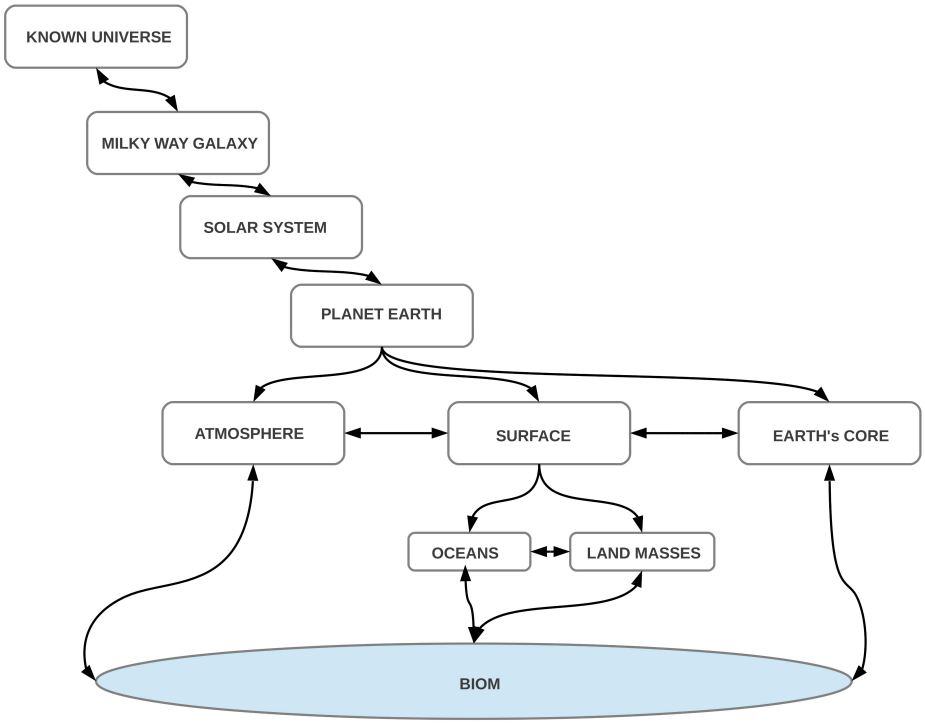

Figure 2: A possible general environment for population simulations

decidable criteria which should be fulfilled to declare a situation as a problem or as a vision it will be necessary that this group of citizens has such a *pre-knowledge*. Without such a pre-knowledge nothing is possible. Therefore it is an interesting question how citizens can acquire a *critical pre-knowledge* of being able to classify something as a problem or as a vision. Here we assume, that some citizens could acquire such a critical pre-knowledge.

3. Because the classification of something as a *problem* can only be a trigger to look for a possible *vision* for a *better state* we focus here on the existence of a vision statement as a starting point for some *analysis* which can result in a kind of a *model of a process* with more better states.

4. The main task then is the challenge to *elaborate* a complete *actor story* showing how a *better process* could look like to enable some improvements compared to some actual process.

5. Such an actor story has to be *tested* whether it looks good for the participating actors and compared to the facts about the real world.

References

[Lev20] N.G. Leveson. Are you sure your software will not kill anyone? *Communications of the ACM*, 63:25 – 28, 2020. https://doi.org/10.1145/3376127.