ARIA Model

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1. ARIA defined

ARIA is a "browser" for the Internet of Everything, bridging the Real and the Data Worlds. The bridges are ARIA tags. These tags are digital layers placed with a positioning provided by ARIA's Augmented Positioning System (APS). APS estimates the coordinates of every point in a user's Field of View (FoV), for both outdoors and indoors. ARIA tags include labelling, and computer programs associated to places, living and non-living objects, experiences and people.

ARIA tags are two-way communication channels between the Real and Data Worlds. Their labels may index the Real World into the Data World. Those labels can be also derived from the Data World, "painting" the Real World.

ARIA tags' associated computer programs may include chat, gaming, advertising, e-commerce and sharing applications connecting tag owners and its users. They may also enable the insertion of "portals", opening for "in situ" virtual reality experiences. Finally, ARIA's tags may transform the user's FoV in a canvas where he or she can insert, draw, send and receive a multimedia object such as three-dimensional image and sound, as part of the browser's semi-holographic messaging system.

ARIA underlying infrastructure is based on a hypergraph model of the Real World. ARIA's tags are nodes on the hypergraph. As such, we may have tags (nodes) that contain other tags (nodes) as, in the Real World, one place may have a tag that includes tags representing objects or experiences that exist in that place.

ARIA's platform includes: a Presentation Layer (the browser available in multiple platforms; ARIA's SDK, and ARIA's tagging app); a Logic Layer (enabling ARIA tags' information management and app development); and the Data Layer (storing ARIA's tags information using a hypergraph model). Key ARIA tags will be stored in a blockchain to enable validation, persistence, and transparency.

2. Macro-view

ARIA's overall goal is to maximize revenues and minimize costs. Both can be expressed as a function of ARIA's tags.

ARIA's revenues may be expressed by the number of tags multiplied by the average revenue per tag. ARIA's costs may be likewise expressed by the number of tags multiplied by the average cost of establishing an ARIA's tag.

3. Tags

ARIA tags may be associated to any place, living and non-living object, experiences, activities, and people. They may also open to "portals" and semi-holographic representations and messaging. ARIA tags may also perform many other functions that may be programmable using its SDK.

Democritus once said that "everything in the University occurs by necessity and chance". ARIA tags were designed to decisively contribute to fulfill human needs, but also to provide unplanned opportunities.

ARIA tag infrastructure will accelerate the economy of efficiency by providing unique place, object and experience identification and finding capabilities. It will improve usage, maintenance and repair of infrastructures and devices. ARIA will also help improve local news media, education, health care, retail, urban mobility, tourism, sports and a range of other activities by supplying information at the right place and time. Finally, ARIA may be used, at home, to tag places and objects suitable for the sharing economy.

ARIA will provide an infrastructure for unplanned opportunities in the form of promotions, donations, and sharing at the hyperlocal level. It will also offer new types of mixed reality entertainment and a unique "holographic" messaging system.

ARIA platform's SDK will, in addition, create an ecosystem of developers around the World programming apps for tags or families of tags associated to consumer and other vertical markets.

Using "back of the envelope" calculations, one can estimate the following average number of tags per city, medium to small size supermarket, and household to provide a sense of magnitude of the number of ARIA tags:

- Essential tags for the city of Lisbon- 50.000;
- Tags for supermarket products (medium size supermarket)- 5.000;
- Tags per household- 50.

The full ARIA model will use finer estimates for the number and type of tags for a selected region.

4. Revenues and Costs per Tag

This infrastructure of tags will translate in revenues from:

- Registering fees for key tags in the blockchain;
- Fees for advertising opportunities (mostly based on promotions) and using;
- E-commerce fees;
- Virtual event fees;
- Sharing economy fees;
- Service fees to vertical market clients;
- Subscription fees for commercial developments with ARIA's SDK.

ARIA will develop this infrastructure of tags with the following costs:

- Centralized investment in the development of ARIA's platform, APS, browser, finding engine, SDK, and tagging app;
- Costs of extracting available tagging information from online;
- Costs of creating tags for vertical market clients (to be covered mostly by service fees);
- Costs of creating tags for consumers (they may be zero for ARIA, if performed by the consumers themselves).
- Costs of developing apps for tags (they may be zero, if performed by independent developers).

The full ARIA model will use ranges for the revenues and costs associated to the different types of tags. It will also include, as appropriate, sharing strategies for both revenues and costs with key partners such as clients, local media, local government, taggers, developers and users.

5. "Taggers" and Developers

ARIA will create use cases to attract "taggers" and developers that will contribute with tags (including associated apps) to add to the browser freely, and in some cases paying for services and subscriptions with ARIA's tokens or Fiat currencies. These are traditional propositions where benefits clearly outweigh costs for traditional vertical market actors. To scale, ARIA must overcome the current evangelical sales and start operating based on a digital marketing trifecta (owned, earned and paid media). These digital marketing activities should translate in mostly digital sales.

ARIA's major advantages in tagging and developing will stem from the ease of use of the tagging app, and the platform's

However, ARIA will need the contribution of numerous "taggers" (and to a smaller degree developers) to create the leading global AR Cloud infrastructure. These "taggers" will range from public and private institutions to individuals. Tagging (as well as app development) may be done as a potentially revenue generating activity, for public service, or simply individual interest.

First, potential "taggers", working locally, must know that ARIA exists and again, understand that the benefits are superior to the costs of tagging. Communication must be planned to create strong local hubs of "taggers" that then may spread the word. A similar process will be done for developers, but at the global level. The system may be patterned after epidemiological models (see http://www.nature.com/srep/2012/120420/srep00371/full/srep00371.html; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3062985/; and http://science5.net/m/maximizing-the-spread-of-in%EF%AC%82uence-through-a-social-network-w2571.html). Social media campaigns may be used following recommendations such

as the ones that may be found in https://adespresso.com/blog/facebook-ads-for-kickstarter-guide/.

Other alternative methods may be experimented using ARIA's connection to social media and the team's experience in gamification. Challenges such as the one described in https://en.wikipedia.org/wiki/DARPA_Network_Challenge may be used to stimulate adoption.

Finally, one may stimulate the development of tags and apps, injecting tokens in ecosystems that may be strong revenue generators in the future. This potential may be estimated by evaluating demand, and making sure that it will outweigh supply (see https://medium.com/@Melt_Dem/drowning-in-tokens-184ccfa1641a).

6. Users

Digital marketing (including the critical contribution of local media), ease of use, usefulness, and delight will be critical to draw user adoption. Tokenization may be used to handle e-commerce or sharing. It may be also applied for user's donations and other expressions of gratitude (replacing, for instance "likes").

Adoption and user behavior (namely conversion rates) will be modelled using available data from similar digital ventures.

7. Causal Diagram

Tags, revenues, costs, taggers, developers, and users are broad categories of variables, that may be discretized by type, and spatial and temporal location. A macro causal diagram may feed into micro-level causal diagrams. These diagrams will include variables as nodes, and polarized arcs showing dependency relationships between variables. Positive arcs will denote same direction variable changes; negative arcs will stand for opposite direction variable changes.

The diagrams will also show positive feedback loops that may be induced by local media partnerships, and, in general, hyperlocal developments raising the value of the tag ecosystem. These hyperlocal contributions will include local goods production and consumption, and other circular economy developments (see http://www.accaglobal.com/content/dam/ACCA_Global/Technical/Future/pi-emerging-business-models-FINAL-26-01-2017.pdf and https://www.fastcompany.com/40571011/7-principles-of-transformative-urban-innovation?partner=rss&utm_source=social&utm_medium=twitter&utm_campaign=rss+fastcompany&utm_content=rss .

8. Dynamic Model

The causal diagram may be translated into spatialized system dynamic models with control and impact components. Equations and parameter values will be derived from available knowledge via human modelling know how and/or machine learning.

The impact of different investment (private placement, venture capital, ICOs), development (resources versus completion times) and marketing (direct, trifecta based) policies may be simulated, enabling their macro definition. The ARIA dynamic model will also allow for testing acceptable ranges for micro variables such as fees and token values.

One may develop a more complex model that may use linguistic and pictorial variables. See https://ydreamsforever.files.wordpress.com/2016/11/unorthodox-modelling.pdf.

9. Implementation

ARIA's team will provide UNL dynamics modelling team with a detailed verbal description of the proposed model (plus other ARIA documents) until June 18th.

Antonio Camara will lecture to the system dynamics class (that includes developers) on June 6th. Hopefully, we may have a first running model by early July. This model will be patented. It will be also used in the pre-sale of ARIA tokens (or any other investment alternative), and, later, in the guidance of ARIA's business development.