



HAL
open science

BabyCloud, a Technological Platform for Parents and Researchers

Xuan-Nga Cao, Cyrille Dakhliya, Patricia Del Carmen, Mohamed-Amine Jaouani, Malik Ould-Arbi, Emmanuel Dupoux

► **To cite this version:**

Xuan-Nga Cao, Cyrille Dakhliya, Patricia Del Carmen, Mohamed-Amine Jaouani, Malik Ould-Arbi, et al.. BabyCloud, a Technological Platform for Parents and Researchers. Journée d'étude CORLI: Traitements et standardisation des corpus multimodaux et web 2.0., May 2018, Paris, France. hal-01873734

HAL Id: hal-01873734

<https://hal.science/hal-01873734>

Submitted on 13 Sep 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

BabyCloud, a Technological Platform for Parents and Researchers

Xuân-Nga Cao, Cyrille Dakhlia, Patricia Del Carmen, Mohamed-Amine Jaouani, Malik Ould-Arbi, Emmanuel Dupoux

Laboratoire de Sciences Cognitives et Psycholinguistique,
EHESS / Ecole Normale Supérieure / PSL Research University / CNRS / INRIA, France

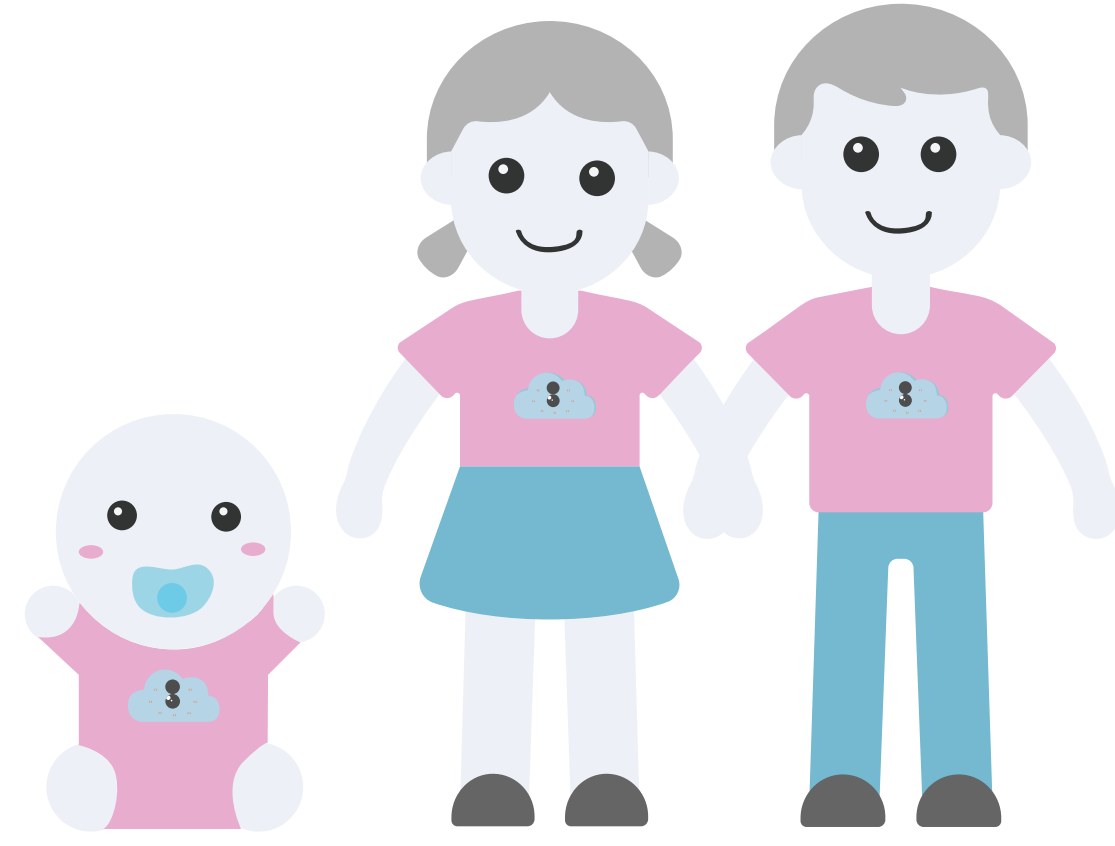
Introduction

Research environments in language acquisition

- Recent progress in infant speech database collection
- Recent progress in computational modeling of developmental processes

Opportunities for:

- Parents: to access tools to explore and document their child's learning progress
- Researchers: to access analytics to understand language acquisition mechanisms



Research Questions

Existing platforms and recording tools

- Existing child data sharing platforms: Childes, Speechome, Homebank
- Existing recording tools: LENA, USB recorders

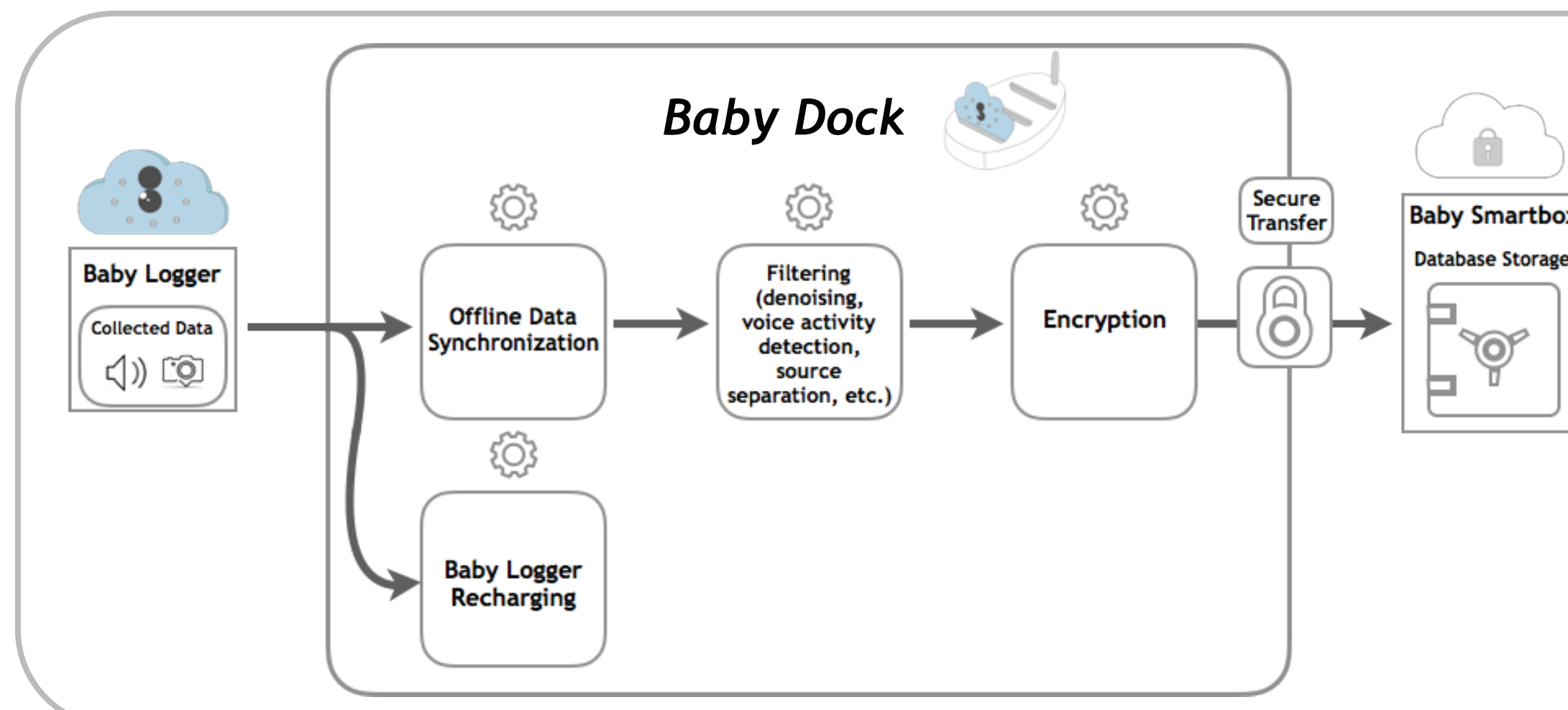
Issues

- Privacy and protection of the collected data
- Audio quality and quantity not optimal for machine learning algorithms
- Proprietary technologies

The Solution: *BabyCloud*

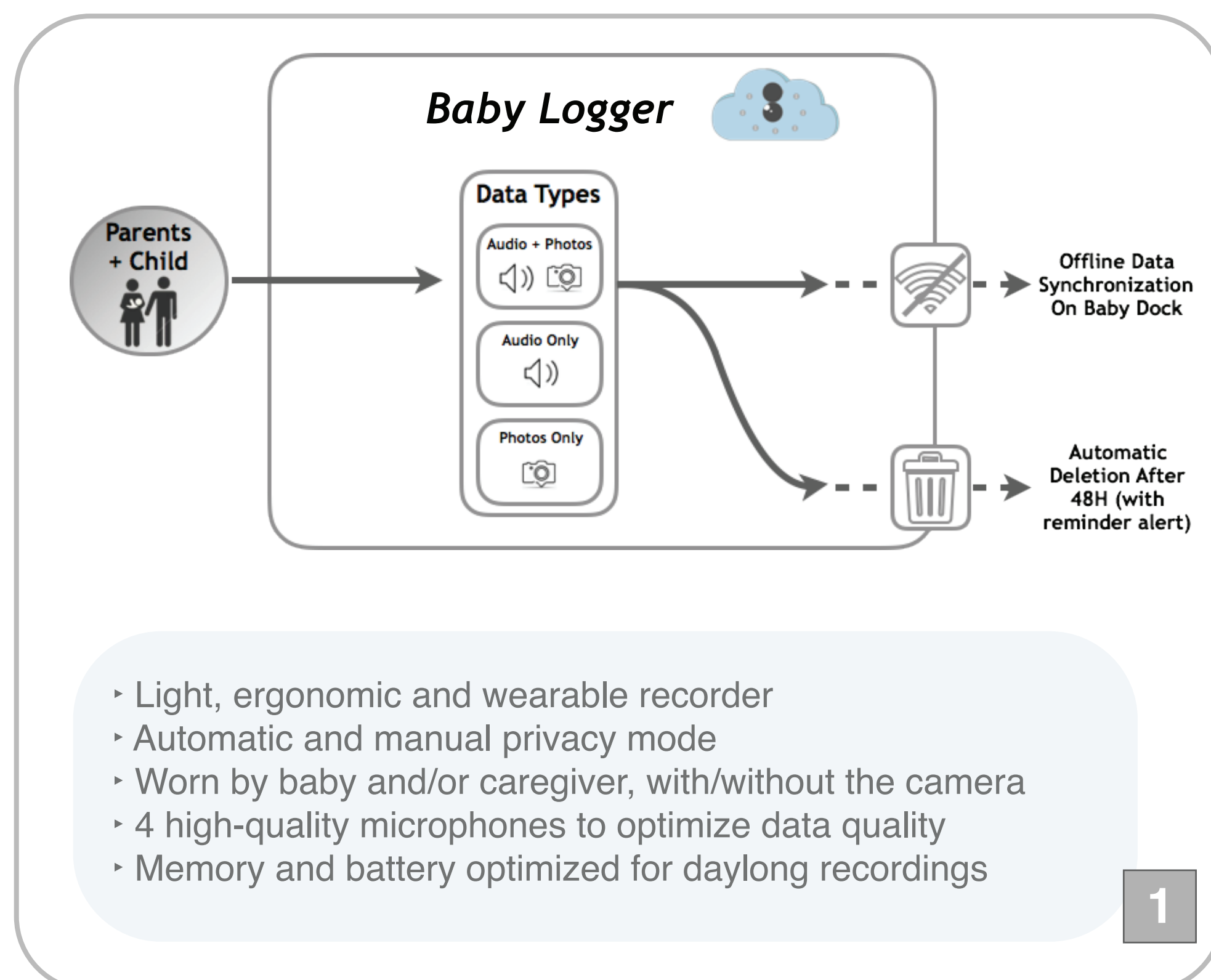
baby cloud

- User-friendly functionalities, optimized for speech processing models
- Gives full control of the data to parents
- Open-source licenses

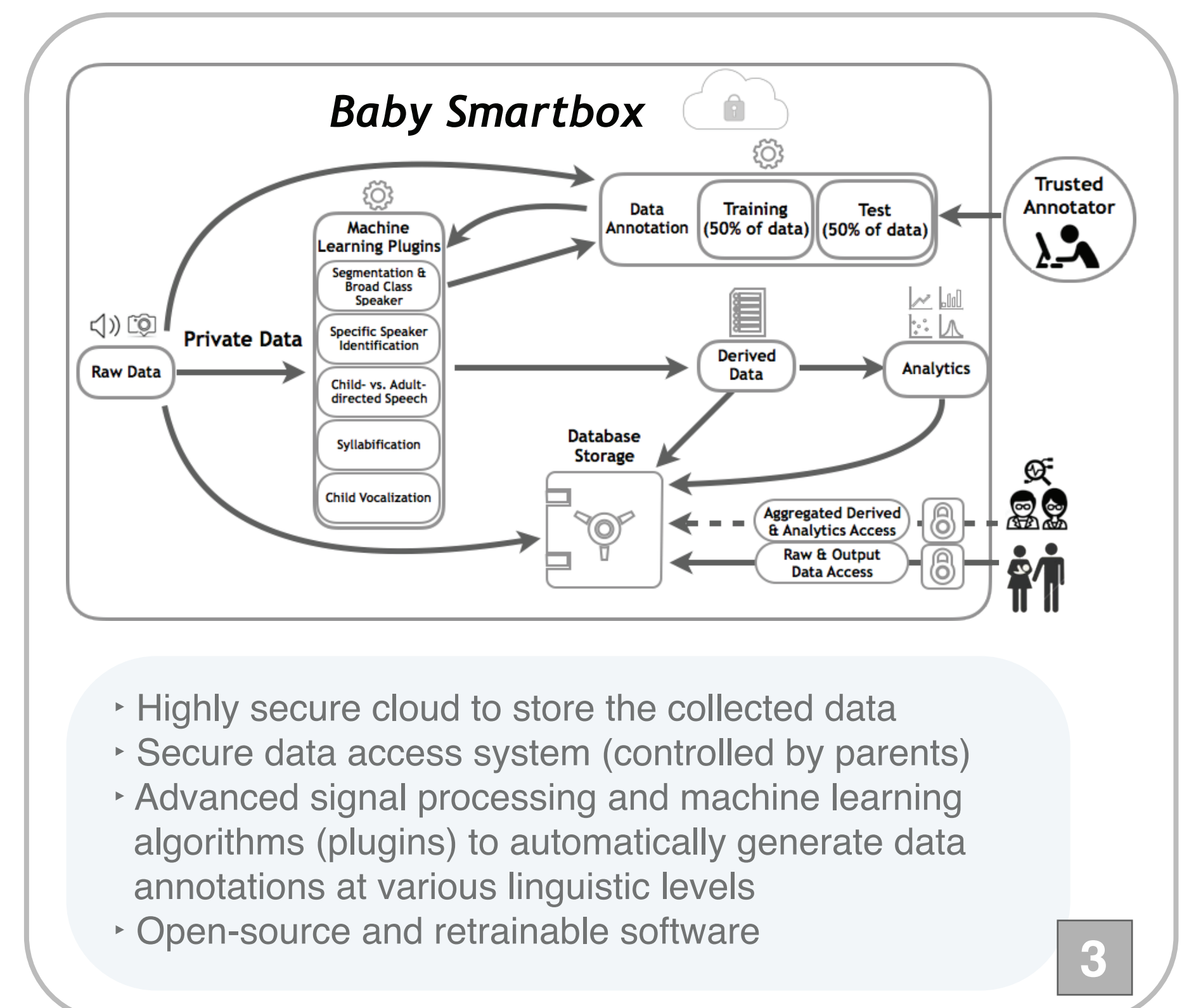
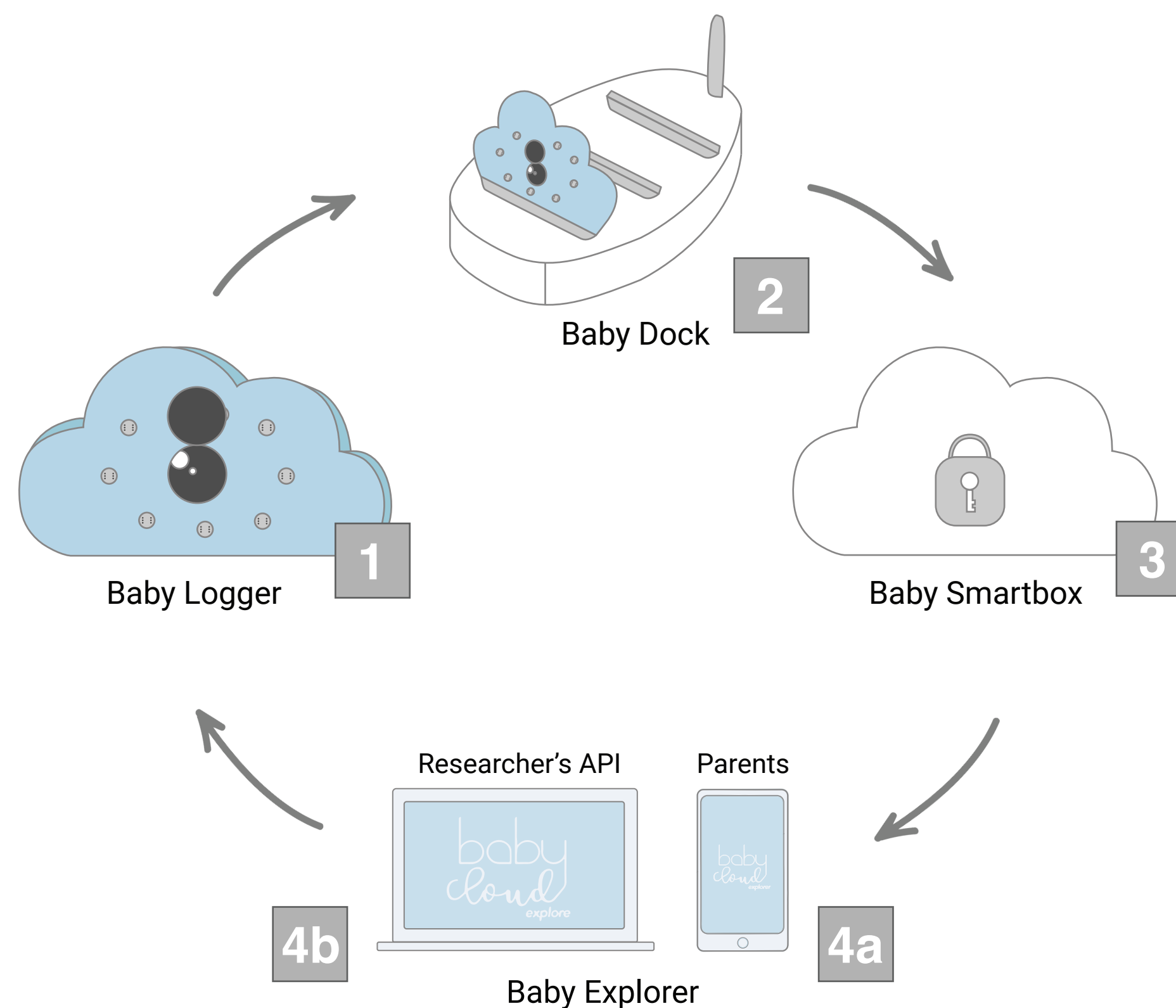


- Charges the battery of the Baby Logger
- Wireless data transfer from the logger to the dock
- Data filtering to reduce the amount of transferred data
- Transfer of the encrypted data to the Smartbox
- Removal of the data from the dock at the end of the process

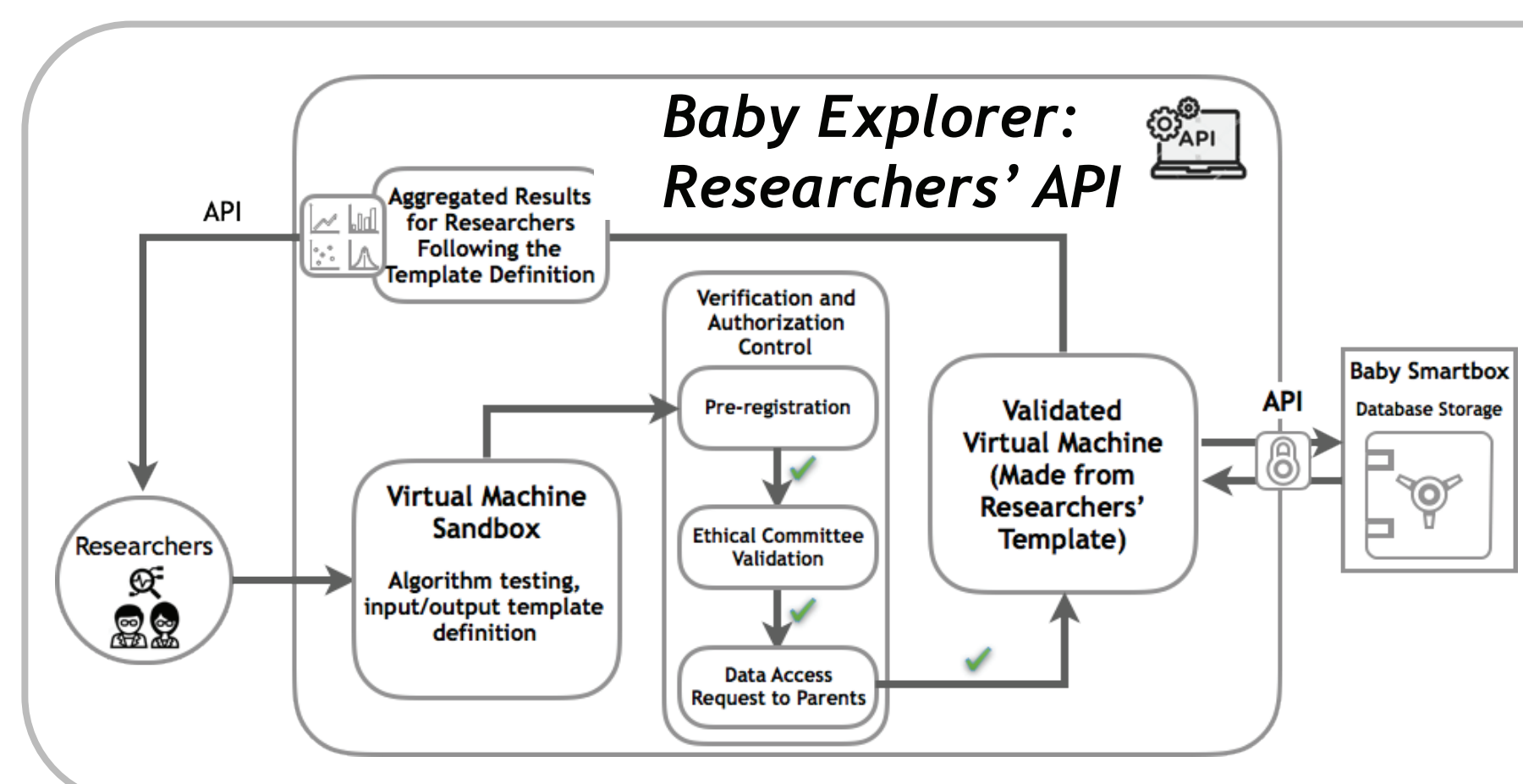
2



1

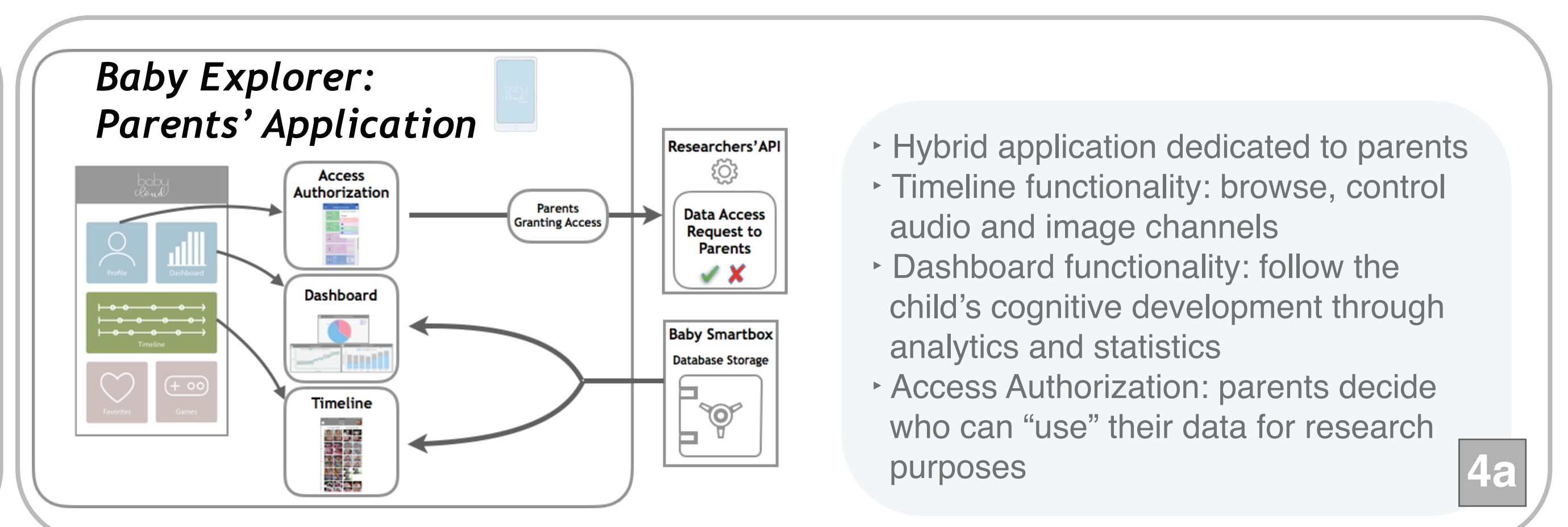


3



- Need pre-test of the algorithms with public data by researchers
- Need pre-registration of their studies
- Need approval by an ethics committee
- Need parents' approval to use their data
- Need validation of the algorithms by the *BabyCloud* platform
- Output retrieved is only anonymized statistics of the data

4b



- Hybrid application dedicated to parents
- Timeline functionality: browse, control audio and image channels
- Dashboard functionality: follow the child's cognitive development through analytics and statistics
- Access Authorization: parents decide who can "use" their data for research purposes

4a

Completed Work

- IRB approval
- Draft of Privacy Impact Assessment to comply with the GDPR
- Working prototype of the Baby Logger
- Working version of the Baby Explorer for parents
- Some modules of the annotation process (vocal maturity, speaker diarization)
- Pilot of 6 families (one day recording)

Future Work

- Secure and encrypt the pipeline and platform
- Test and miniaturize the Baby Logger
- Design shell for the Baby Logger
- Develop the Baby Dock
- Develop the Baby Explorer for researchers
- Collect feedback from pilot families

Conclusion and Expected Impact

BabyCloud: innovative platform whose objective is to strengthen collaboration between parents and researchers

Benefits

- Full protection and control of the data by the family
- Better quality of life: digital portfolio of the child's early stages in life
- When certified clinically, could spot potential developmental delays and trigger early medical intervention

References

Carbajal, J., Fér, R., and Dupoux, E. (2016b). Modeling language discrimination in infants using i-vector representations. In The 38th Annual Conference of the Cognitive Science Society, pages 889–896.

Casillas, M., Bergelson, E., Warlaumont, A. S., Cristia, A., Soderstrom, M., VanDam, M., and Sloetjes, H. (2017). A new workflow for semi-automatized annotations: Tests with long-form naturalistic recordings of children's language environments. In Proc. Interspeech 2017, pages 2098–2102.

Ludusan, B., Mazuka, R., Bernard, M., Cristia, A., and Dupoux, E. (2017). The role of prosody and speech register in word segmentation: A computational modelling perspective. In ACL 2017.

MacWhinney, B. (2000). The CHILDES Project: Tools for analyzing talk. Mahwah, NJ: Lawrence Erlbaum Associates, 3rd edition.

Oller, D.K. (2011). LENA: automated analysis algorithms and segmentation detail: how to interpret and not over-interpret the lena labelings. In LENA Users Conference, Denver, CO.

Räsänen, O., Doyle, G., and Frank, M. C. (2018). Prelinguistic segmentation of speech into syllable-like units. Cognition, 171:130–150.

Warlaumont, A. S., VanDam, M., Bergelson, E., and Cristia, A. (2017). Homebank: A repository for long-form real-world audio recordings of children. In Proc. Interspeech 2017, pages 815–816.

Xu, D., Yapanel, U., Gray, S., and Baer, C. (2008). The lena language environment analysis system: the interpretive time segments (its) file. Technical Report No. LTR-04-2, LENA Foundation Technical Report.

Acknowledgements

We would like to thank our past and current team members who dedicated their efforts to this project: Dasha Ilina, Anne Billot, Elsa Tahiri, Constance Prieur, Corentin Jaclin, Nefeli Xylouri, Manel Khenout, Nick Hamilakis, as well as the very useful feedback from the CoML team.

Our research was funded by the European Research Council (ERC-2011-AdG 295810 BOOTPHON). It was also supported by the Agence Nationale pour la Recherche (ANR-10-IDEX-0001-02 PSL and ANR-10-LABX-0087 IEC), the ENS Fondation (chaire Almerys) and the CORLI consortium.

