Memorandum

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Onderwerp
ePartner architecture workshops 'The Results'

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Zie bijlage



TNO innovation for life

ePartner architecture workshop

The results

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Content

This presentation is the deliverable of the ePartner architecture workshop held on April 23 – 24, 2012 in Zeist as part of *ETP Gedrag & Innovatie.*

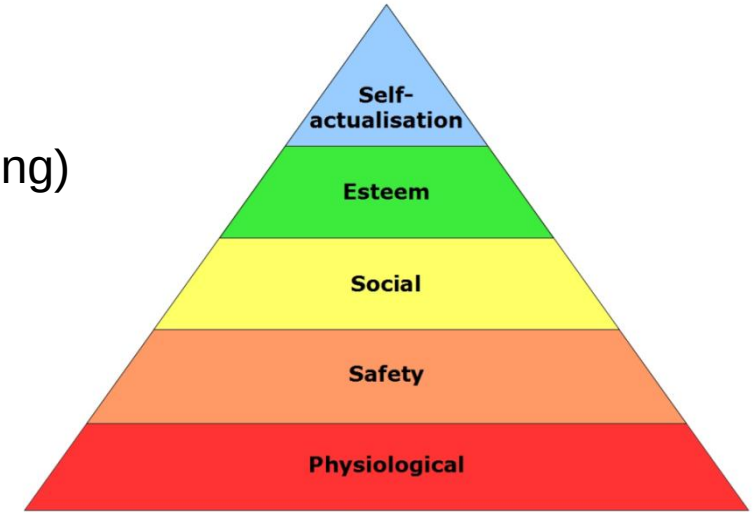
- What is an ePartner?
- What are the requirements for an ePartner?
- How does the architecture for an ePartner framework look like?
- Conclusions
- Future work/Open research questions
  - Roadmap



What does a ePartner do?

Support a human during life to realize human needs (Maslow*)

- Physiological needs (e.g., nutrition)
- Safety needs (e.g., personal and financial security, health and well-being)
- Belonging (e.g., social support)
- Esteem (e.g., acknowledgement)
- Self-actualization (e.g., learning)



* Maslow, A.H. (1943). "A Theory of Human Motivation," Psychological Review 50(4): 370-96.



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Illustrations of ePartners



How does a ePartner do it?

An ePartner …

… **collects** data about the user and context (physical, social, temporal)

… **reasons**, based on what all ePartners (and what their users?) collectively know

… responds in a **human-like** manner (intuitive, empathetic, affective, own character) to what it knows

… **socializes**, i.e., involve social environment and ePartners

… **learns** from human-ePartner interaction (e.g., behavior, feedback)



What are ePartner requirements?

An ePartner should …

… keep information **private and safe**

… be **trustworthy** for the user

… use its information in an **ethical** way

… be **transparent** in its behavior



Task: construct an ePartner architecture

Group task

- Construct a common, coherent and consistant architecture for ePartners to be developed in.

Proposed solution

- Service oriented **architecture** based on intelligent sensor networks
- Tailored towards specific human-ePartner needs



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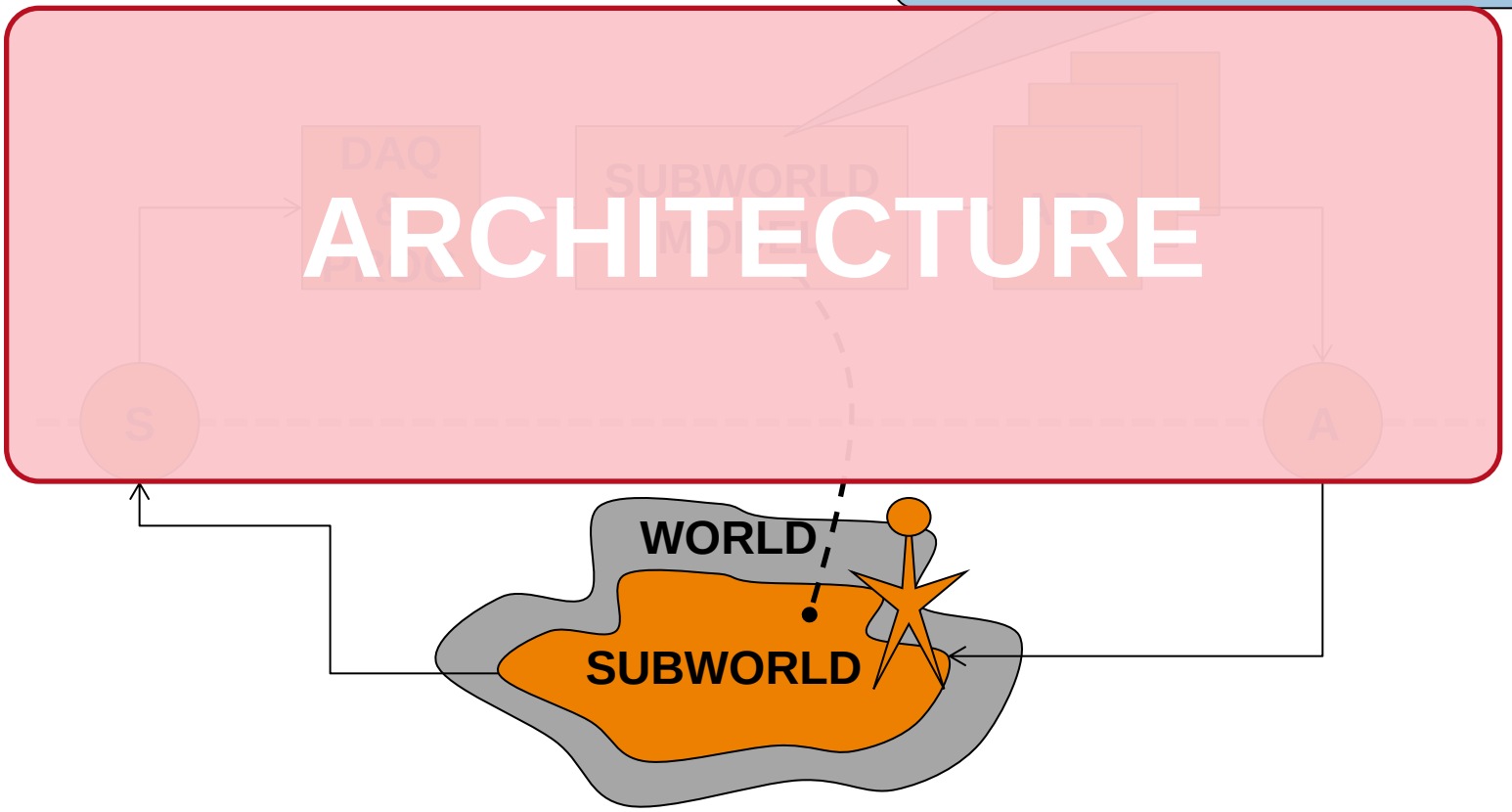
Architecture: the big dataflow picture

Knowledge base
"Isolation" of apps from sensing





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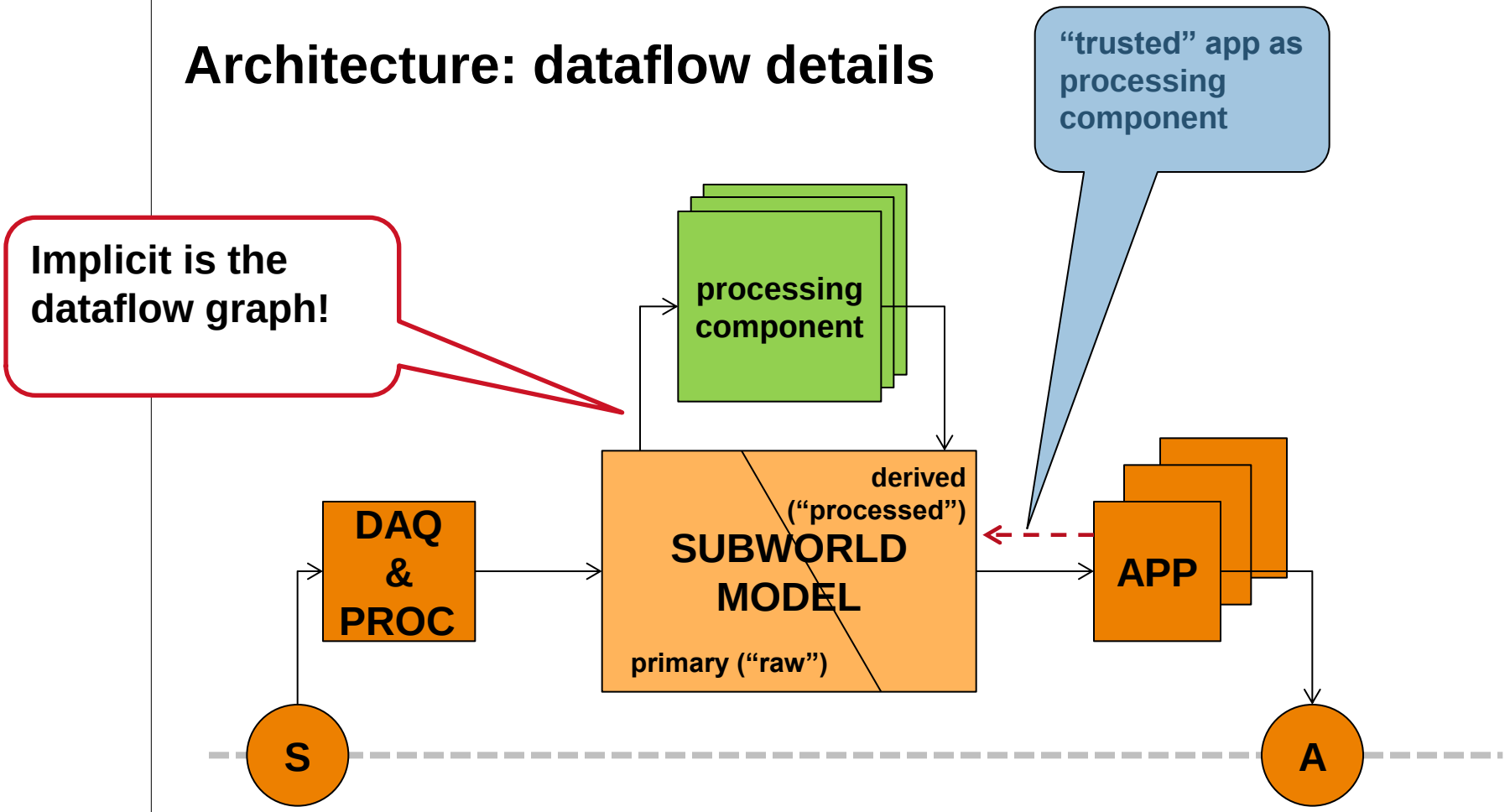
Architecture: dataflow details





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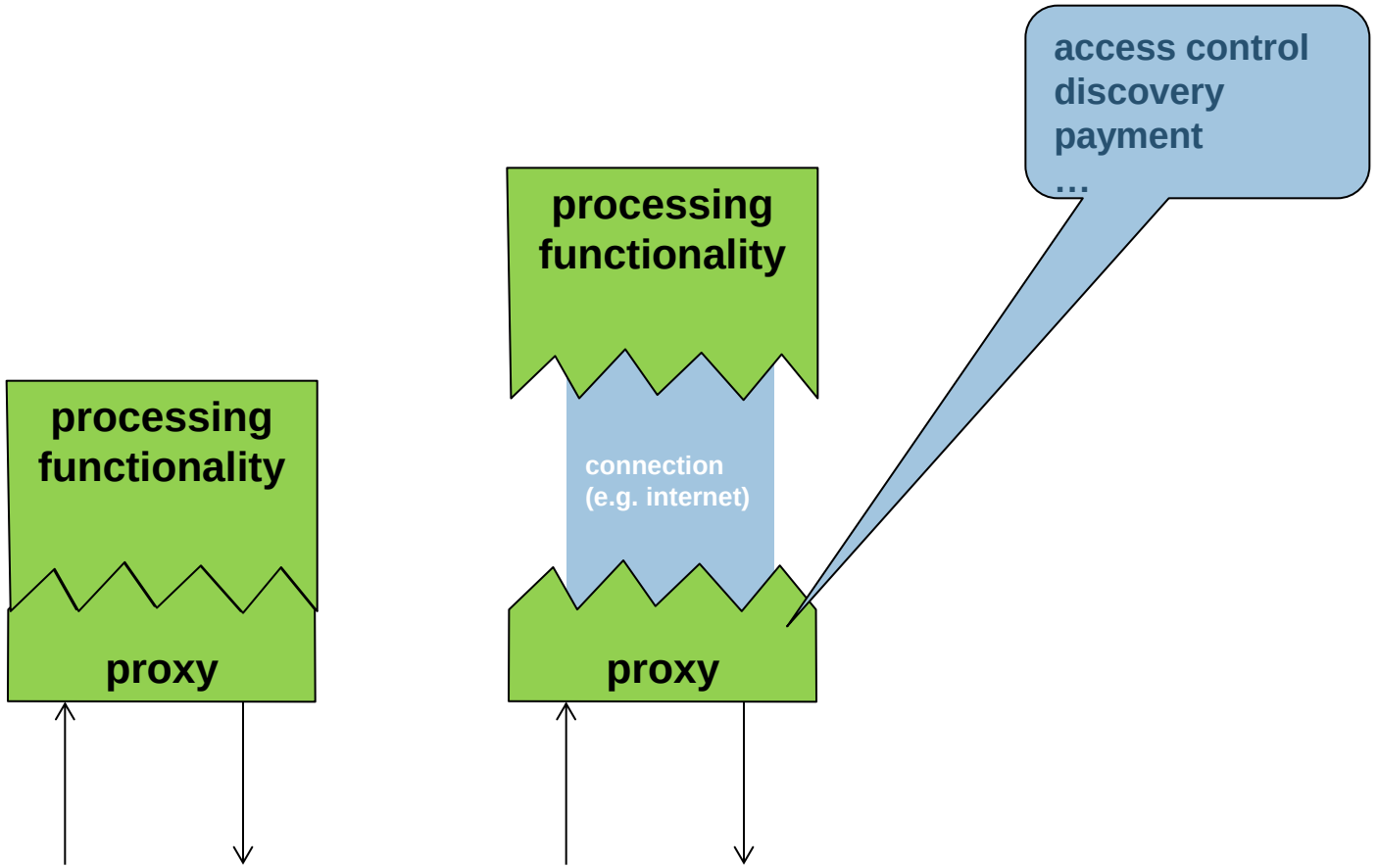
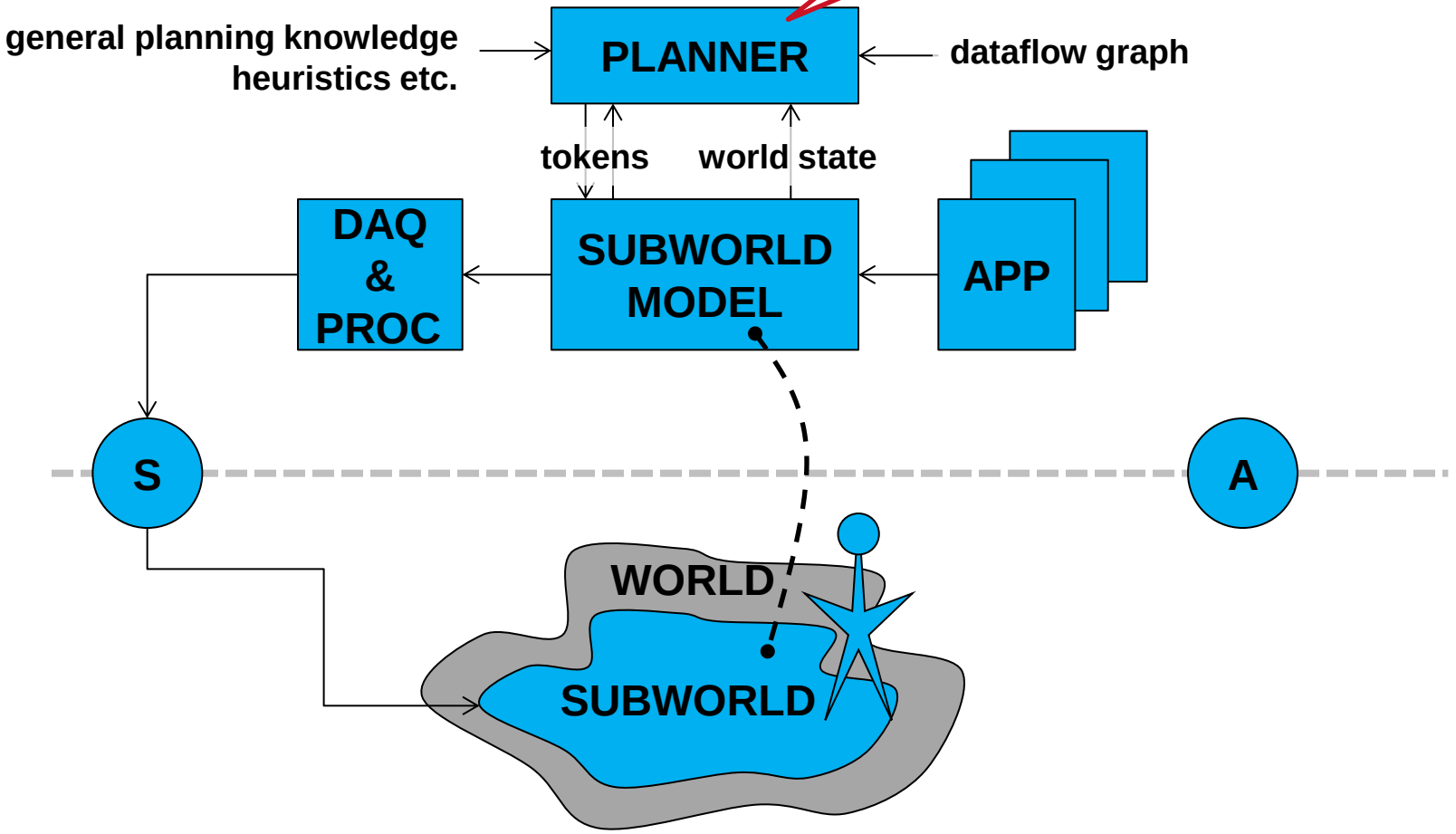
Architecture: dataflow details





Control flow

Time scheduling is in the planner and NOT in DAQ & APP





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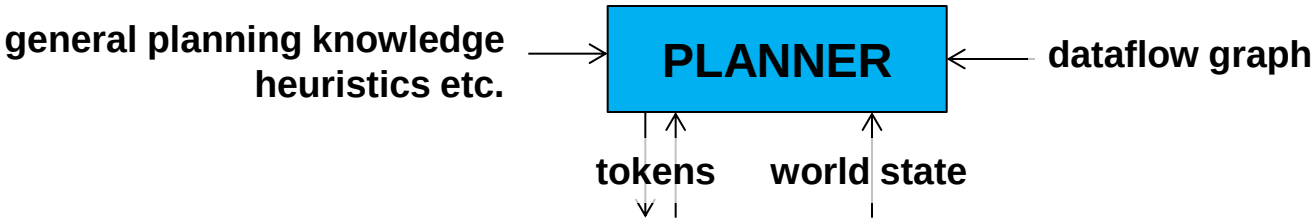
Planner

- Planner receives tokens (requests for information: calculation or acquisition from sensor &/or user)
- It determines if, when and in which order to release propagated tokens
- It considers metadescriptors (Quality, Timewindow, etc) in this process.





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Flow of control

- Keeping world model up to date always might not be useful all the time (wasting computation and communication resources)
- Processing graph defines the dependencies between output, transformations and input
- Request propagation needs non-trivial processing (because of specific ePartner requirements) [The planner]



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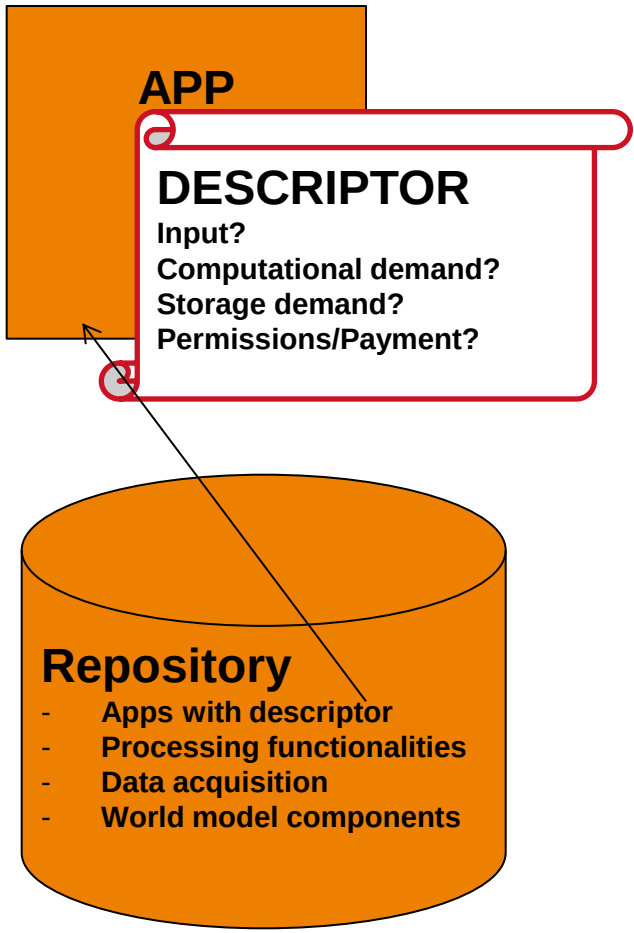
Let's add an app!

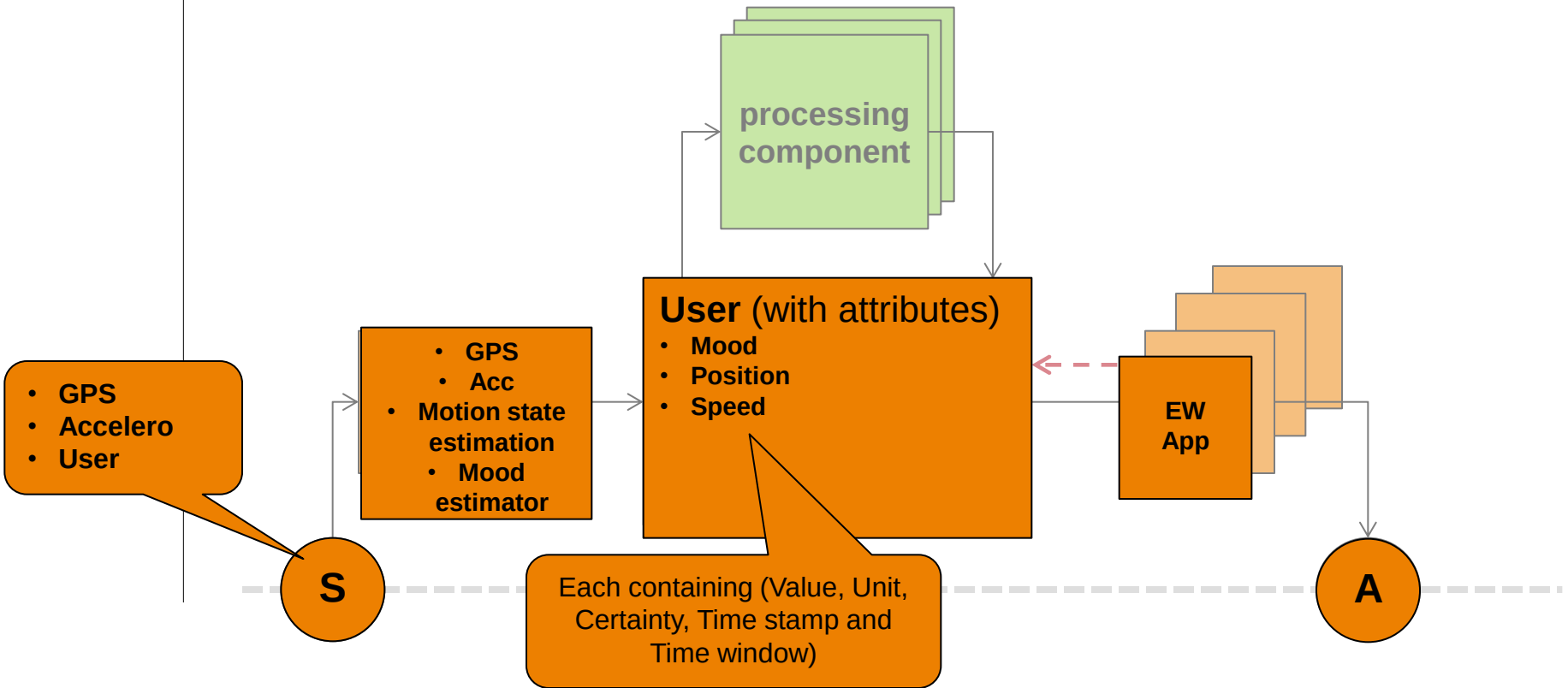
- An app always has a descriptor
- Simple case: all requirement for the app are already available on the device -> deploy and have fun.
- Complex case: **matching process** takes into account: local capabilities and available components in repository and makes a decision which components should be deployed
- Matching can be simple or complex optimization process
- Management (matching) can be done locally (not optimized) and centralized





Example: exercise/workout app

Basic idea: calculate the energy burned and giving feedback on quality of exercise.





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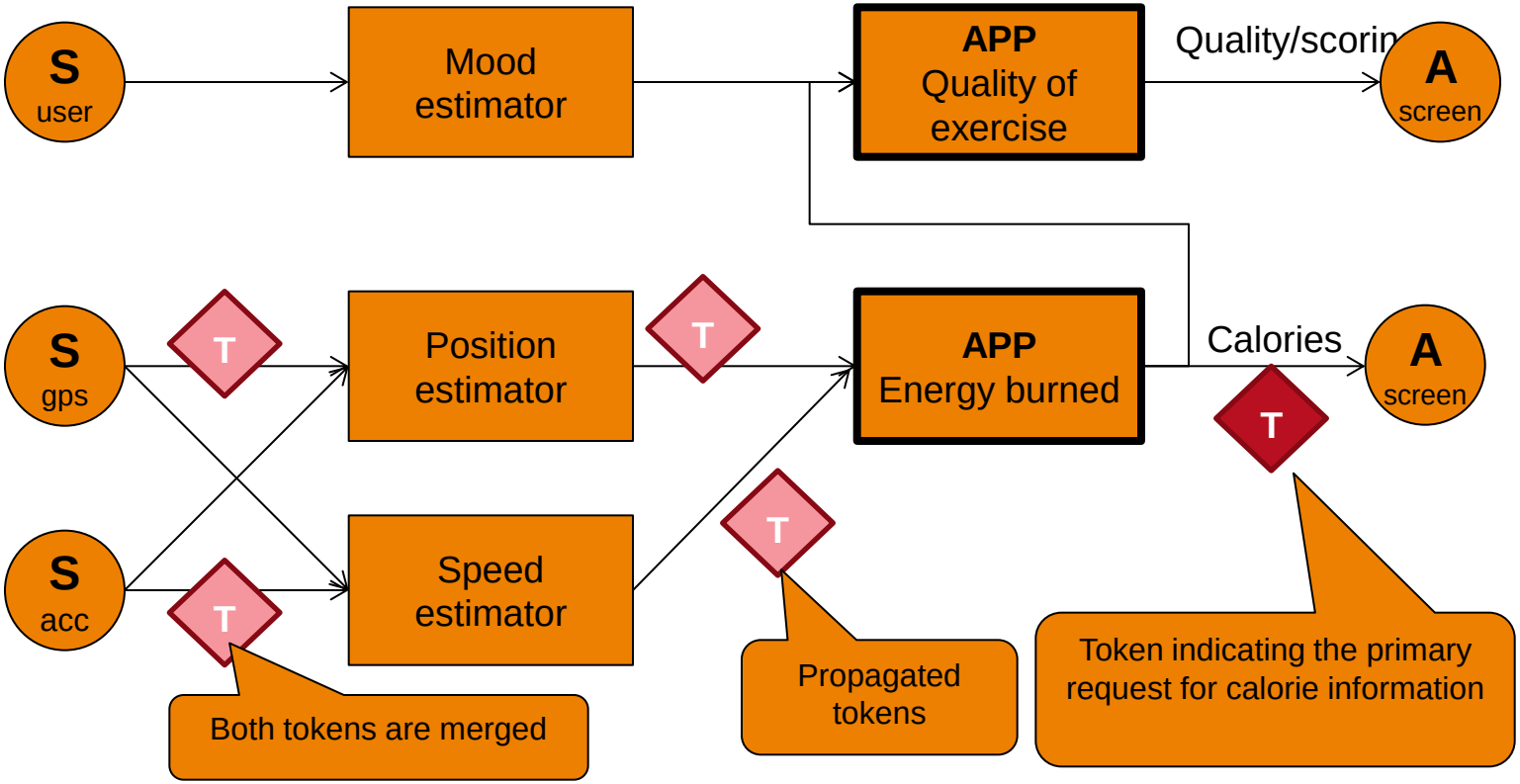
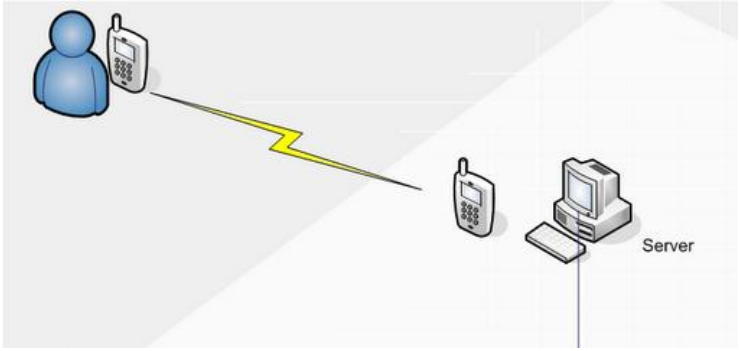
Example: exercise/workout app data flow





Architecture: Physical view

- ePartner architecture runs primarily local, but can be synchronized with your own home server (for backup and history, family etc)
- ePartner server for repository and directory services (look up other ePartners) (Explicitly NOT sharing subworld models here)
- ePartners can communicate over networks (Wifi/3G to internet, Bluetooth to local devices)





Conclusions

- Different markets need specific ePartners
- A generic framework helps TNO to create ePartners in a more efficient en faster way
- A service oriented architecture could be tailored to fit the ePartner architecture needs
- The ePartner expert group has a common understanding of the ePartner architecture
- This outcome forms a solid base for future broad use within TNO



Future work/ Open research questions

Privacy

- Hoe afhankelijk is de privacy van gebruikers voor verschillende toepassingen.
- Wat gebeurt er met privacy gevoelige gegevens binnen de ePartner? Wie is eigenaar?

Ethics

- Welke verantwoordelijkheden heeft een ePartner in ethische kwesties?
  - tov van de gebruiker
  - tov de maaatschappij

    “met drank op achter het stuur”, “door rood lopen”, advies rondom zwangerschap”

  Einde van het spectrum: “Waar kan ik hier een bom kopen?”

Trust

Hoe perfect moet je ePartner zijn?
Hoe dwingend is de suggestie van een ePartner?
In hoeverre vertrouwt de ePartner de informatie over jou?

Autonomy

“Zal ik dit voortaan automatisch voor je doen?”

Transparent

why does ePartner behave the way it does and for whom?



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Proposed steps towards implementation

- First start with a mobile device and a server (for example use Android)
- Extend the functionality
- Extend the number of devices

- Who to ask for implementation Service Oriented Architecture SOAP?

- Mobile computing group TNO mobility
- DSS/imaging The Hague



Roadmap

from Assistants → **to ePartners**

Reason over large datasets

Stand alone device

Integrated in daily life

Fragmented apps

Ambient & non intrusive

Single tasks

Personal






Connected

Sub conscious

Persuasive

2012

Current **assistants** are fragmented and standalone

2017

2022

Future **ePartners** are integrated, connected and personal


TNO
Toekomstbeeld ePartners