Requirements Engineering

(Summer 2021)

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https://github.com/nanniu/RE-Summer2021

Today's Menu

Tuesday (July 20)
*i**
ASN3 Release

Wednesday (July 21):
RE Research
(ASN2, ASN3 Q&A)

Thursday (July 22):
Req.s Traceability
ASN4 Release

Yesterday's Take-Aways

→ *i**: what, why, & how?

→ Assignment 3: what & when?

Due by 9am July 22

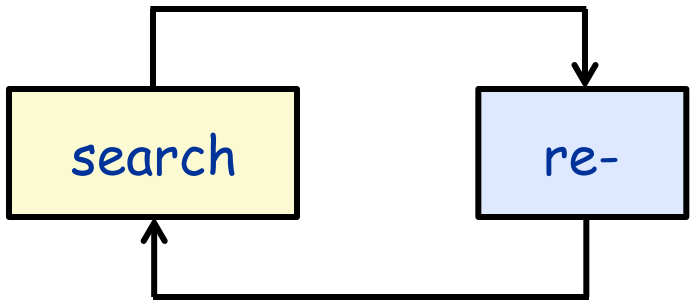
One ASN3 submitted – Awesome work!

Today's Take-Aways

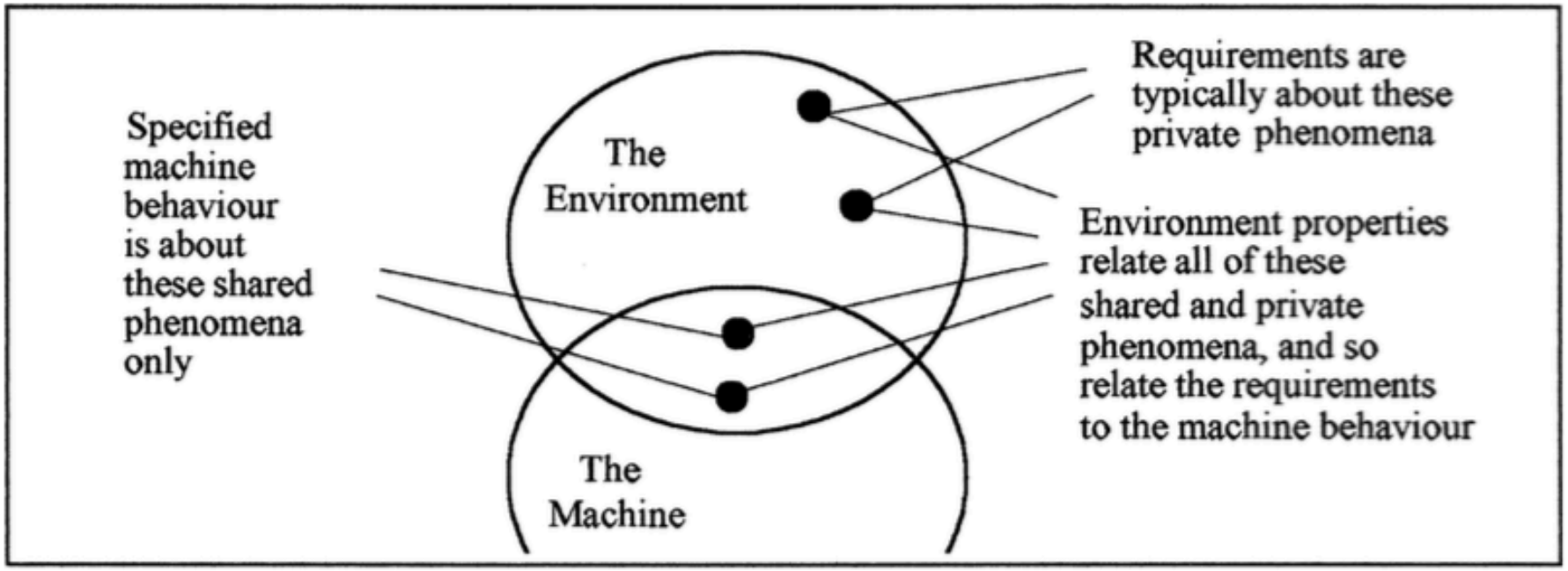
→Research: create and disseminate new knowledge

→Research: conceptualize, operate, present

→Research:



Ɛ, S |- R



When testing whether 'R' is fulfilled by 'S', does writing down 'Ɛ' explicitly help?

Medical Domain

→ 'R': a patient wants to make a doctor's appointment

→ 'Ɛ'

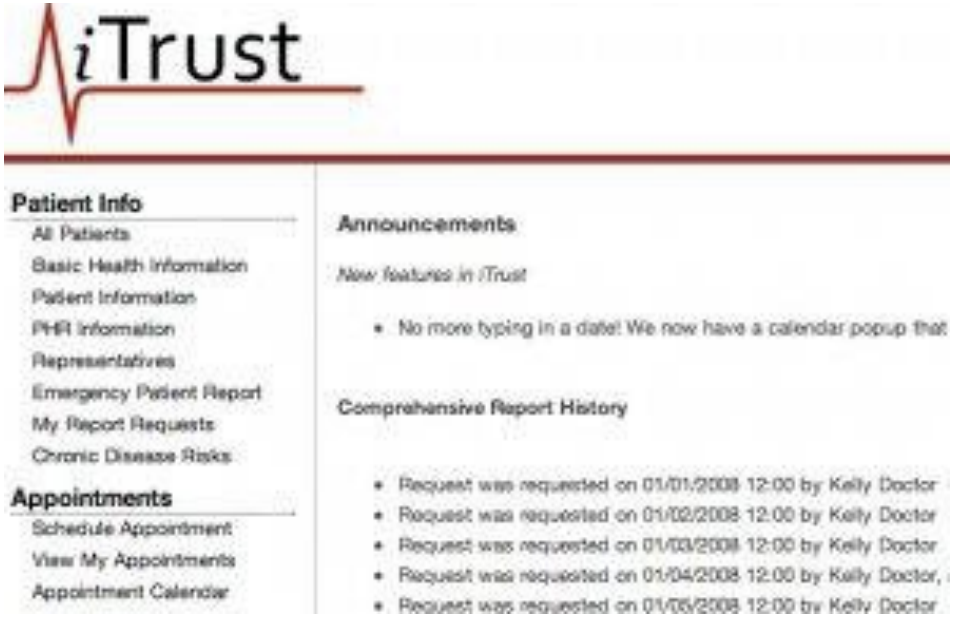
- The patient trusts the doctor
- The doctor is qualified
- An appointment can scheduled for only a future date & time
- Different appointments should not have overlaps
- …

→ 'S'

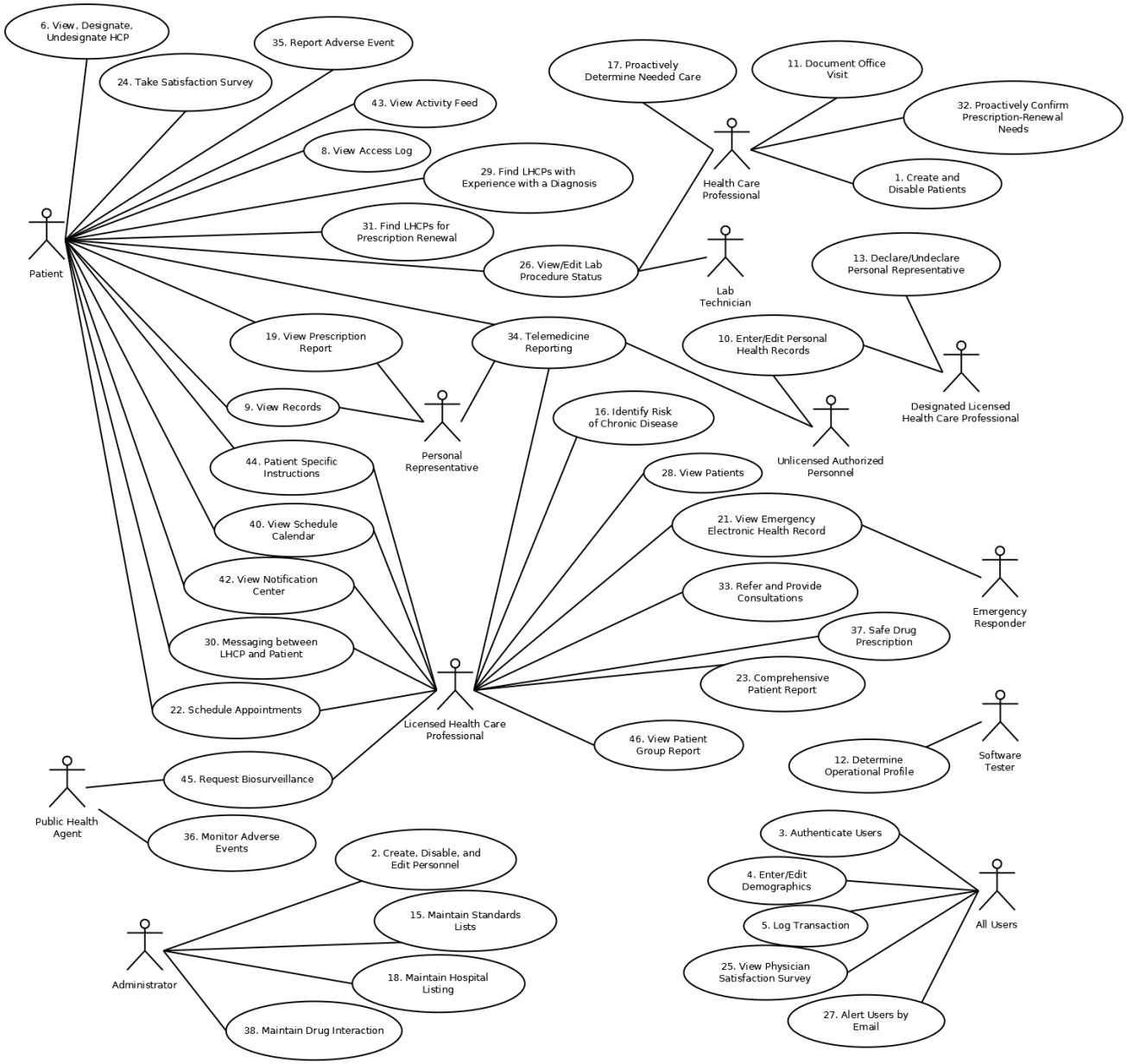
- making a phone call
- paying a visit to the doctor's office (e.g., before the end of an appointment)
- using an app (a software-intensive system)
- …

iTrust written mainly in Java

Dataset	LOC (K)	COM (K)	Source
iTrust	18.3	6.3	Req



iTrust use cases



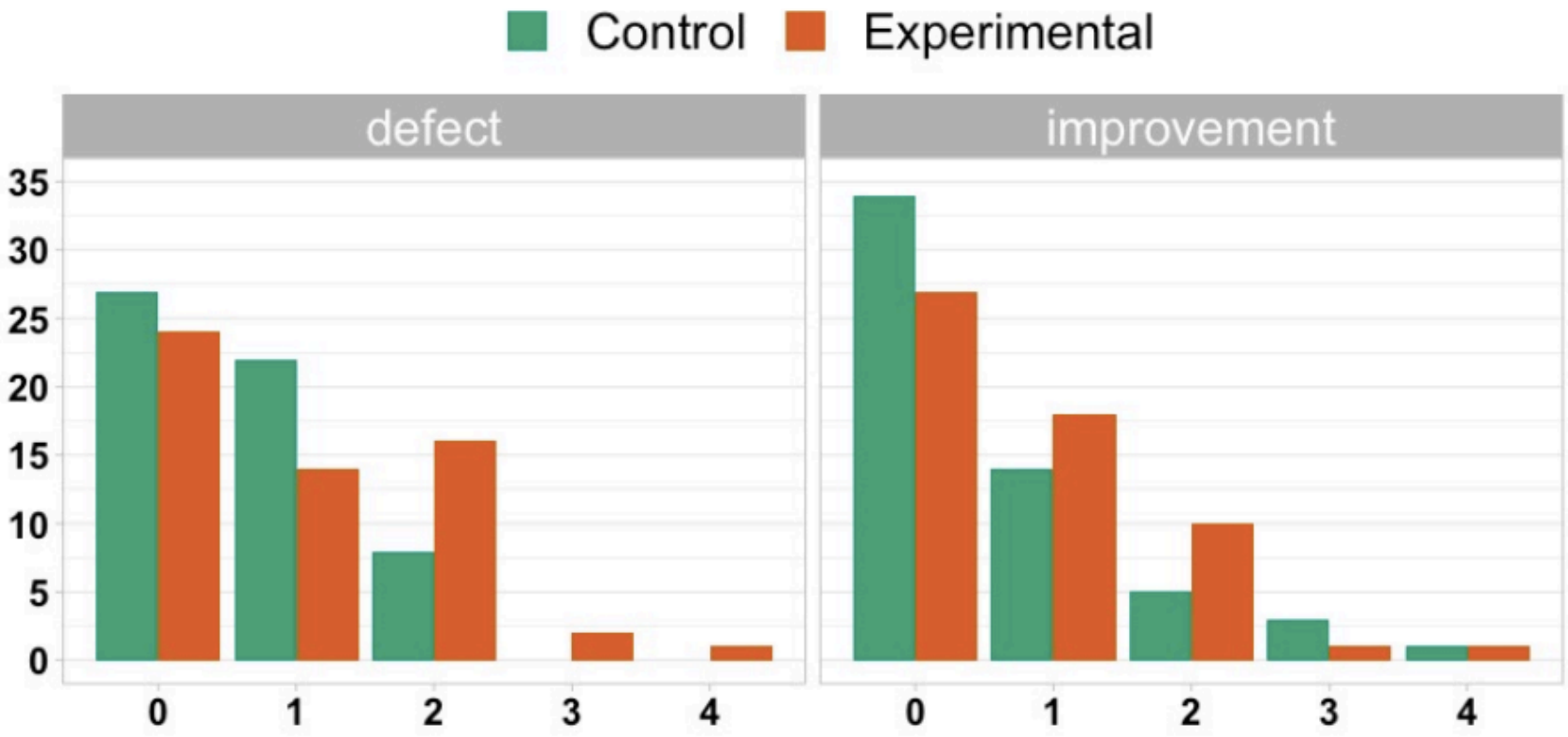
iTrust as a machine

→ Allows a patient to make a doctor's appointment for a past date & time

- Security concerns: integrity & non-repudiation
- Fixable once the "deviation from Ɛ" is known

Su	Mo	Tu	We	Th	Fr	Sa
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Results of "When testing whether 'R' is fulfilled by 'S', does writing down 'E' explicitly help?"



Participants identifying defects and improvements.

Results of *"When testing whether 'R' is fulfilled by 'S', does writing down 'E' explicitly help?"*

MISSISSIPPI STATE UNIVERSITY

University of CINCINNATI

The Role of Environment Assertions in Requirements-Based Testing

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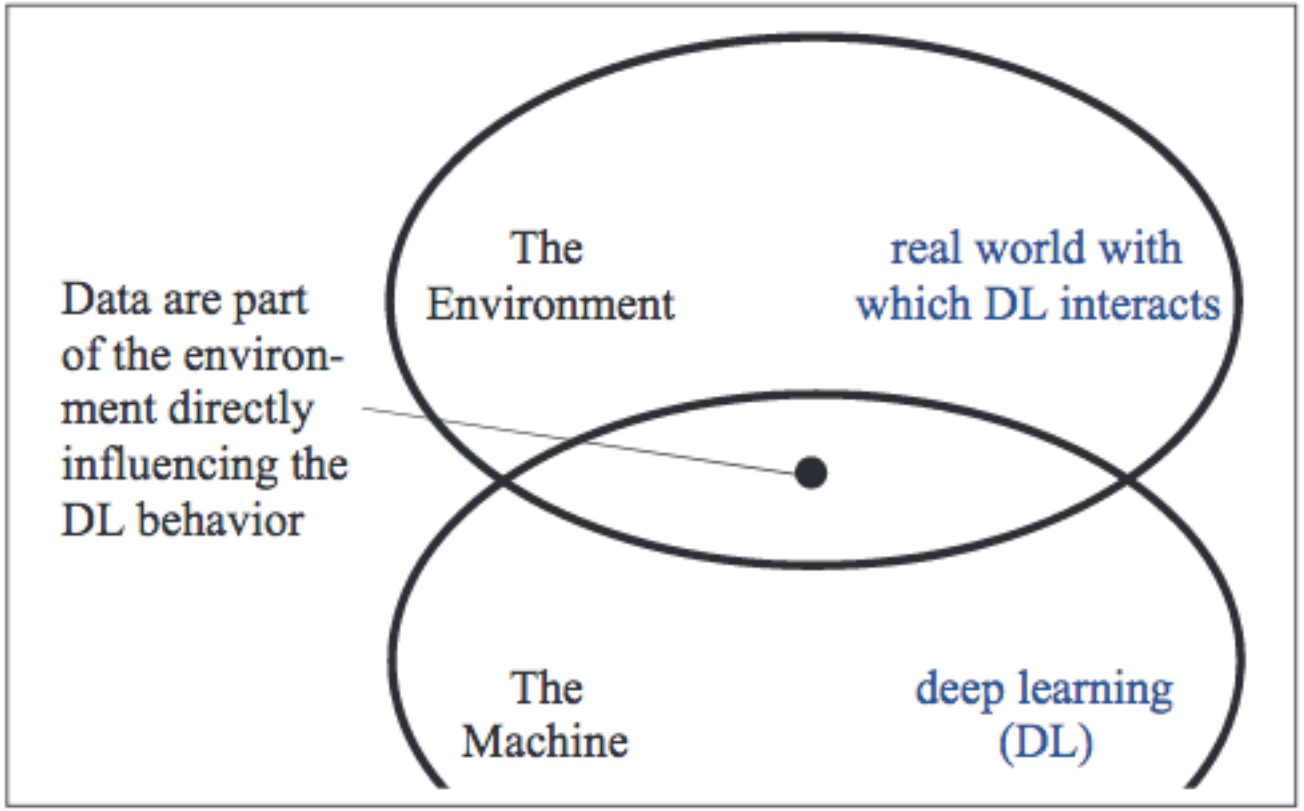
* Department of Computer Science and Engineering, Mississippi State University, USA
† Department of Electrical Engineering & Computer Science, University of Cincinnati, USA

Automated support toward formulating 'ε'

Environment-Driven Abstraction Identification for Requirements-Based Testing

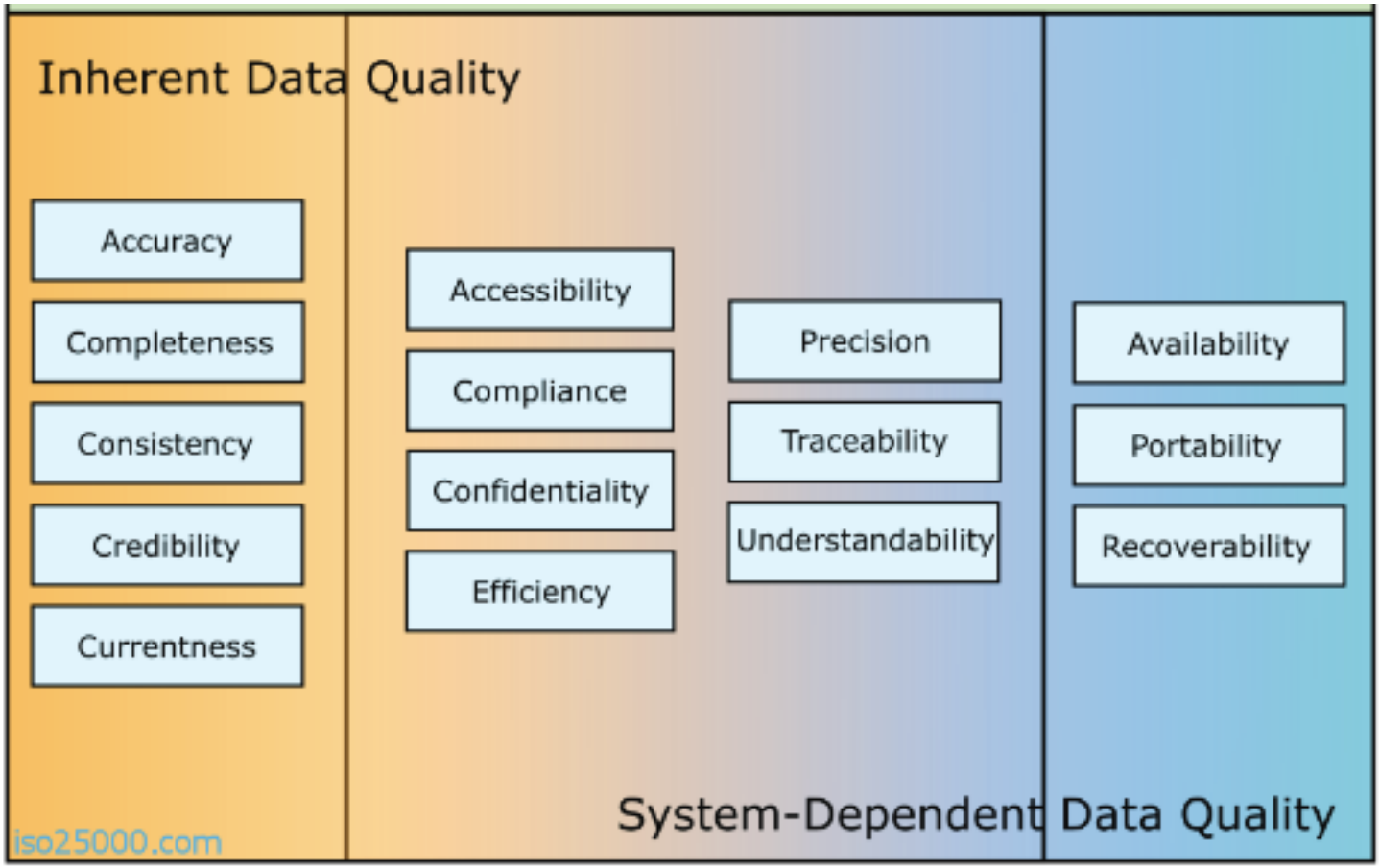
Zedong Peng, Prachi Rathod, Nan Niu, Tanmay Bhowmik, Hui Liu, Lin Shi, Zhi Jin

What about deep learning?

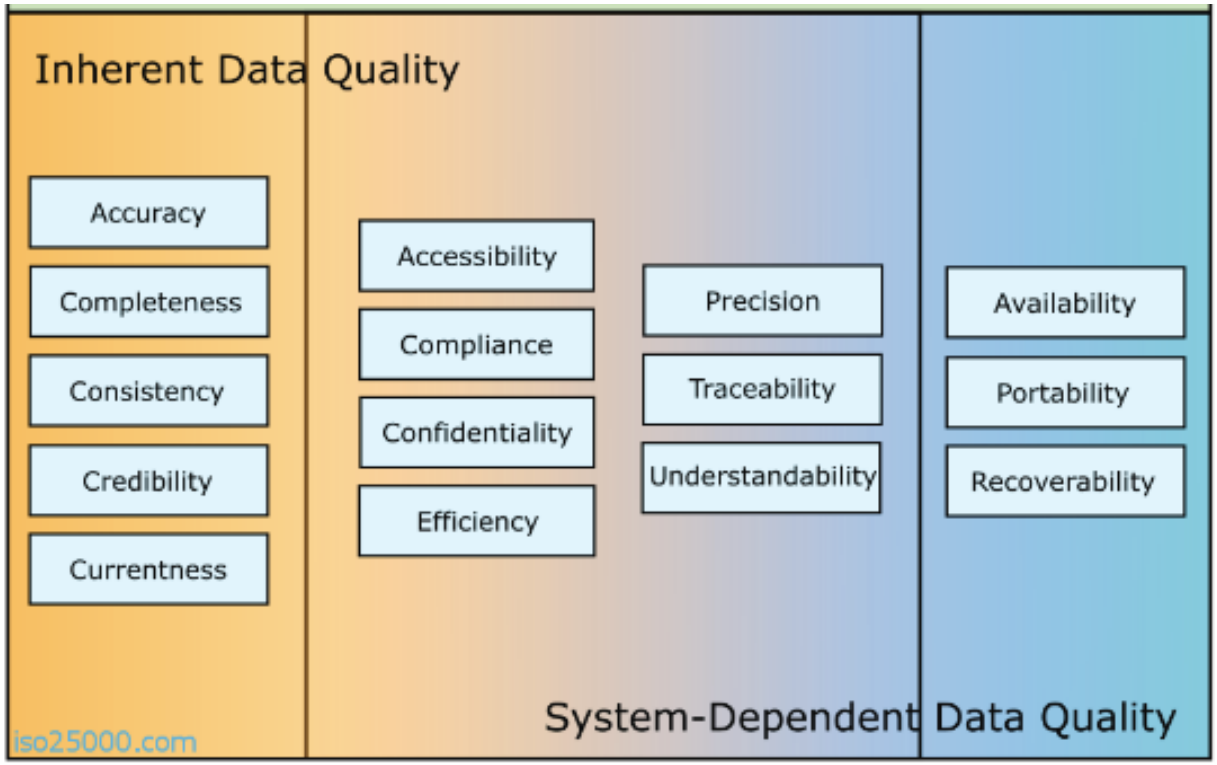


Data lie in the overlap of the DL machine and its environment.

High-quality requirements



High-quality requirements: *SRS vs. Data*



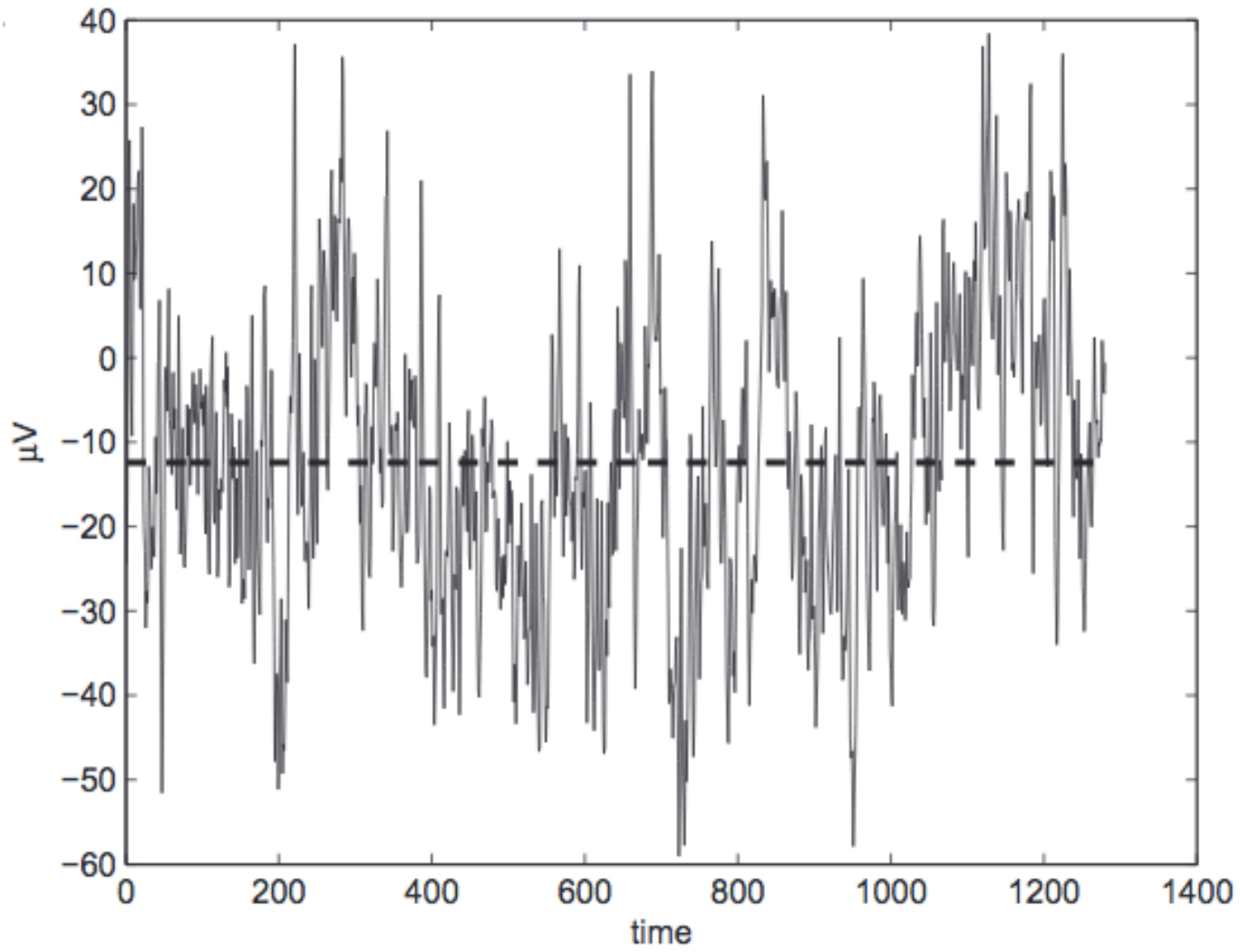
a) Correct;
b) Unambiguous;
c) Complete;
d) Consistent;
e) Ranked for importance and/or stability;
f) Verifiable;
g) Modifiable;
h) Traceable.

Stationarity of time-series data

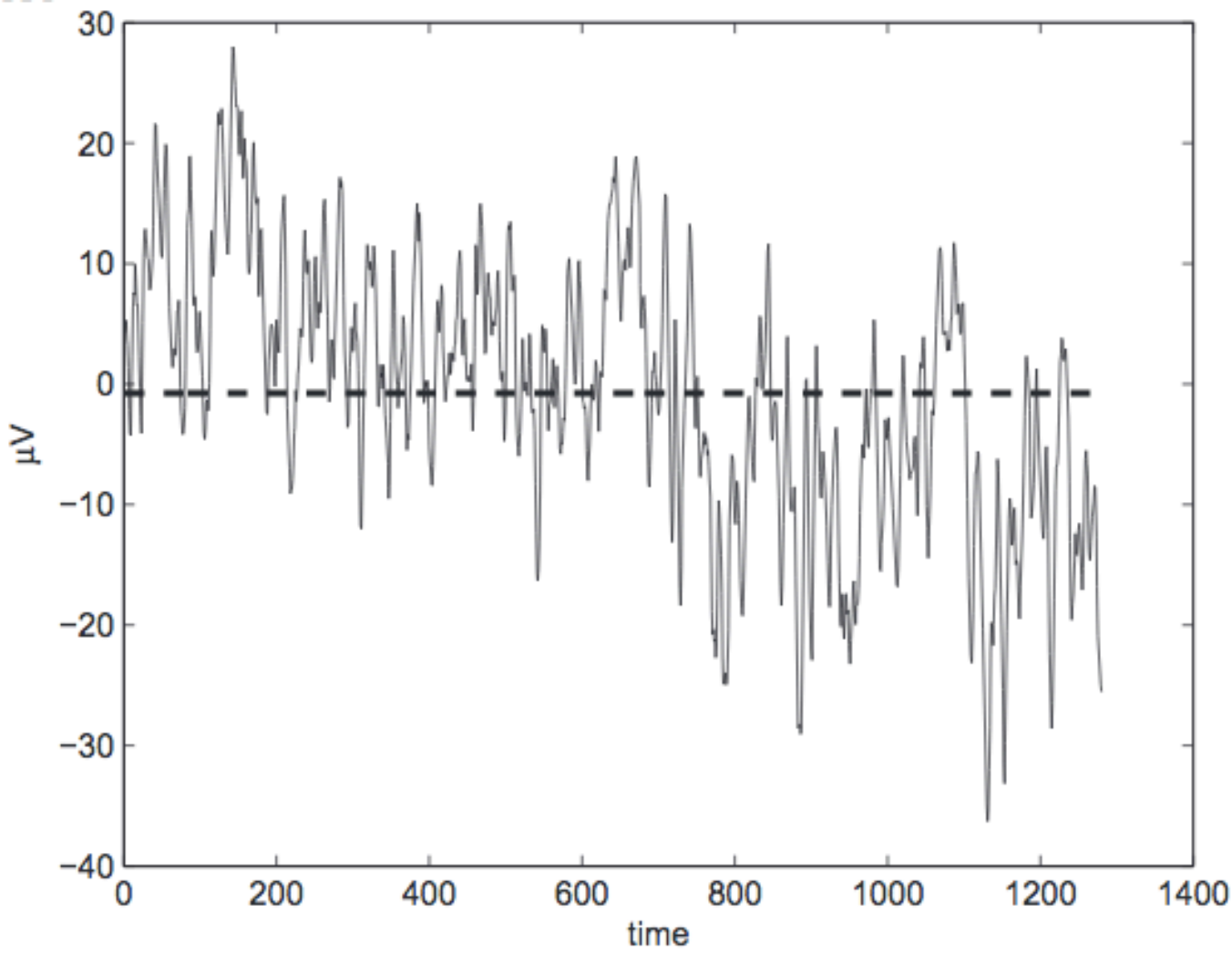
More formally, a time series is *strictly stationary* if the joint distribution of $X(t_1)$, $X(t_2)$, ..., $X(t_n)$ is the same as the joint distribution of $X(t_1+\tau)$, $X(t_2+\tau)$, ..., $X(t_n+\tau)$ for all t_1, t_2, ..., t_n, τ, where $X(t)$ denotes the random variable at time t [40]. In other words, shifting the time origin by an amount of τ has no effect on the joint distributions, indicating that the statistical properties of the time series are invariant with respect to the window in which the data are analyzed. In practice, it is often useful to define stationarity in a less strict sense, and hence a time series is *weakly stationary* if both the variance and the mean are constant [40].

↳data being coherent with each other in a specific context

Stationary

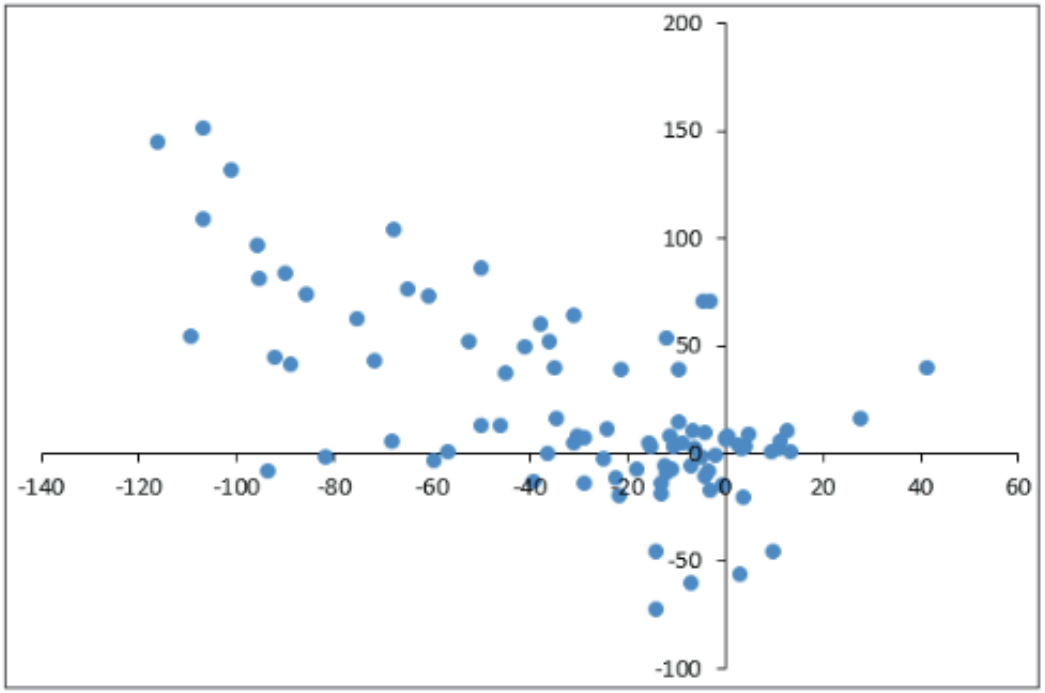


Non-stationary



Making data inconsistent

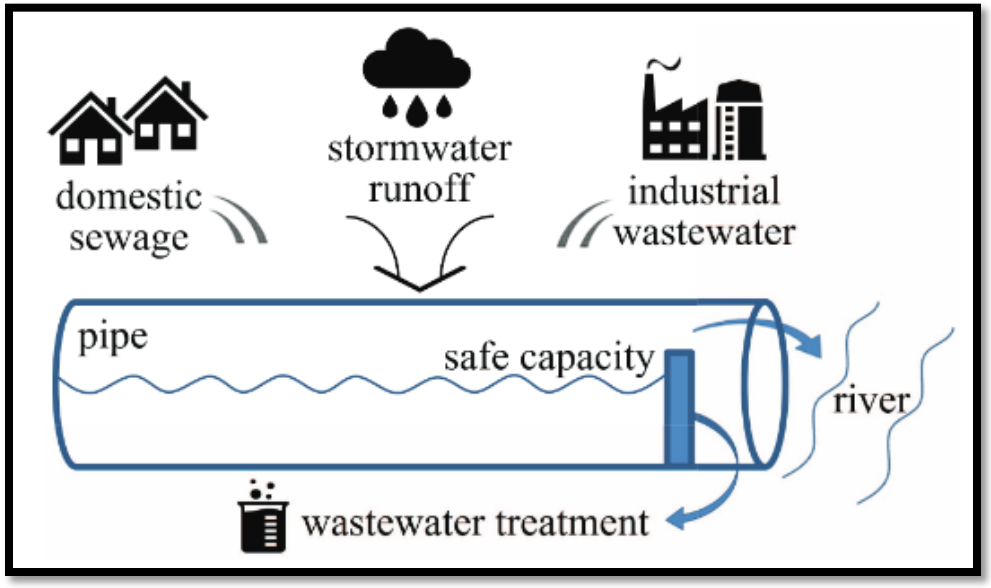
- Idea: By introducing noises to a multivariate time-series data, we're making the data from more stationary to less stationary. As a result, an LSTM's prediction should become less accurate.



We're working with MSDGC on the CSO prediction problem

- RNNs
  - LSTM, GRU, IndRNN
- NFRs
  - Robustness, incompleteness, inconsistency, explainability

METROPOLITAN SEWER DISTRICT of greater CINCINNATI



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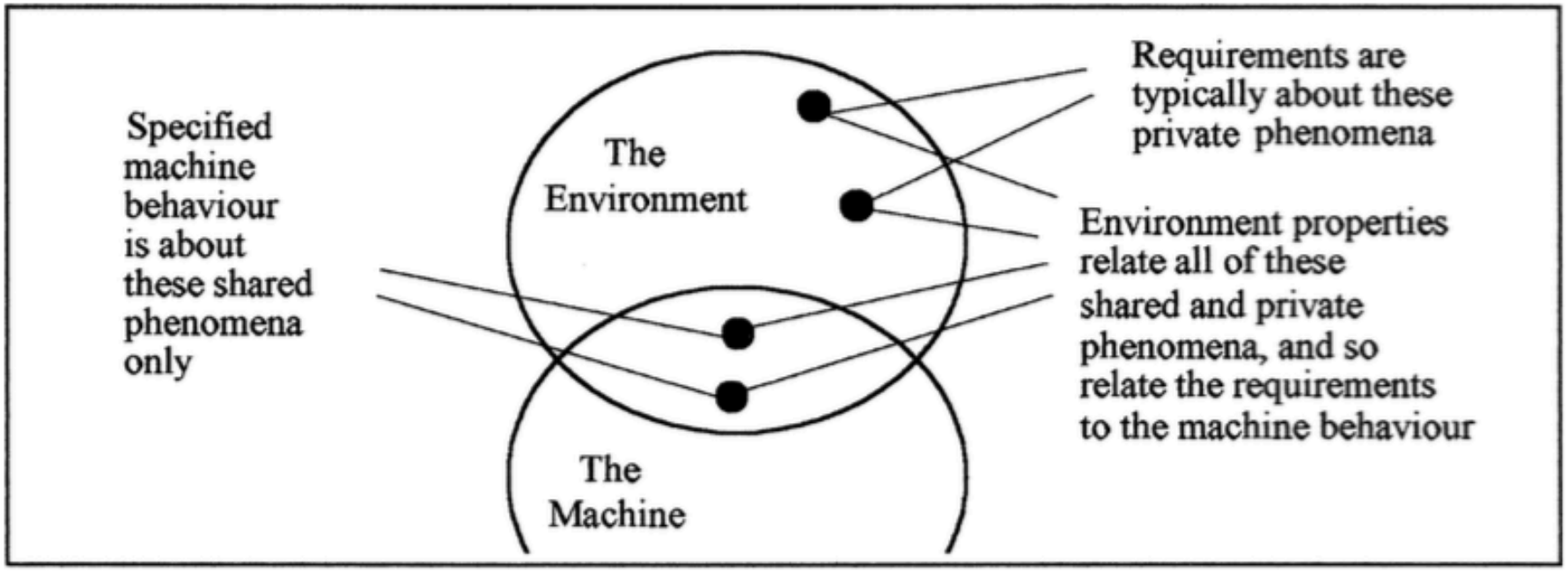
Does "Ɛ, S |- R" work in DL?



R: "translate the food menu into English to taste sth. new"

S: "given text *t* in Chinese, output an equivalent target language text *t'* "

Ɛ: "knowing old taste" (more intelligent), "knowing food allergy" (safer), …

Final remark on "research"