



# ROUTINE SIMULATOR

26-JUN-2014

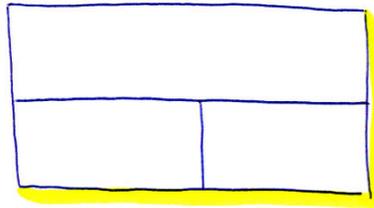
HEIKO SCHMITT



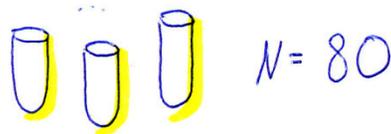
# Exordium (Introducion)

GIVEN:

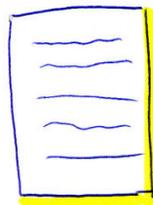
- A INSTRUMENT



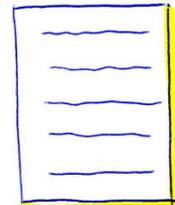
- 80 SAMPLES



- TWO COAGULATION TESTS



PT

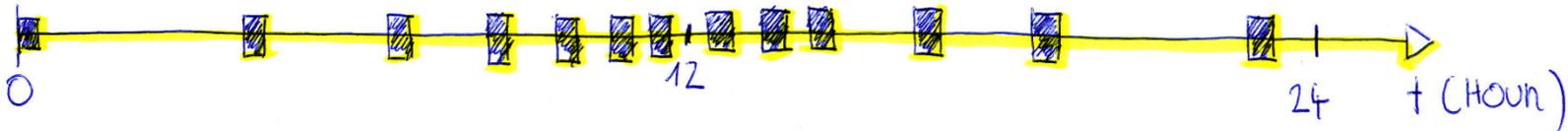


APTT

# Exordium (Introducion)

SEARCHED :

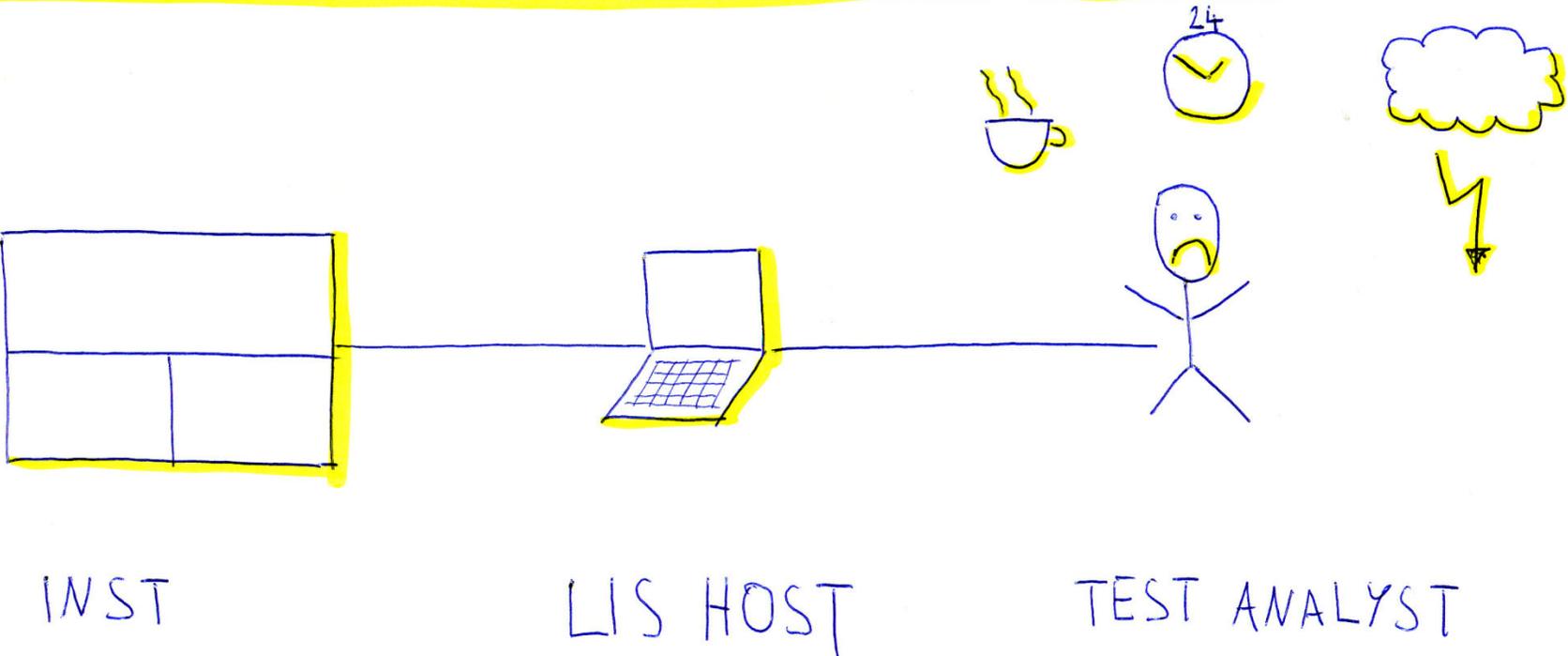
A WAY TO ORDER A PT- AND A APTT TEST  
FOR EACH SAMPLE GAUSSIAN DISTRIBUTED  
OVER 24 HOURS



▨ = BATCH ORDER

# Exordium (Introducion)

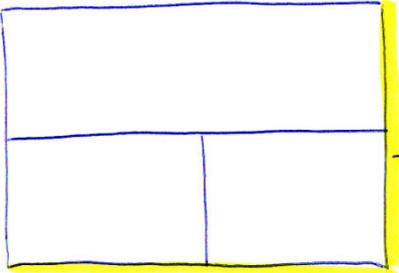
SOLUTION A: MANUAL TESTING



# Exordium (Introduccion)

SOLUTION B: ROUTINE SIMULATOR

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INST



LIS HOST



ROUTINE  
SIMULATOR

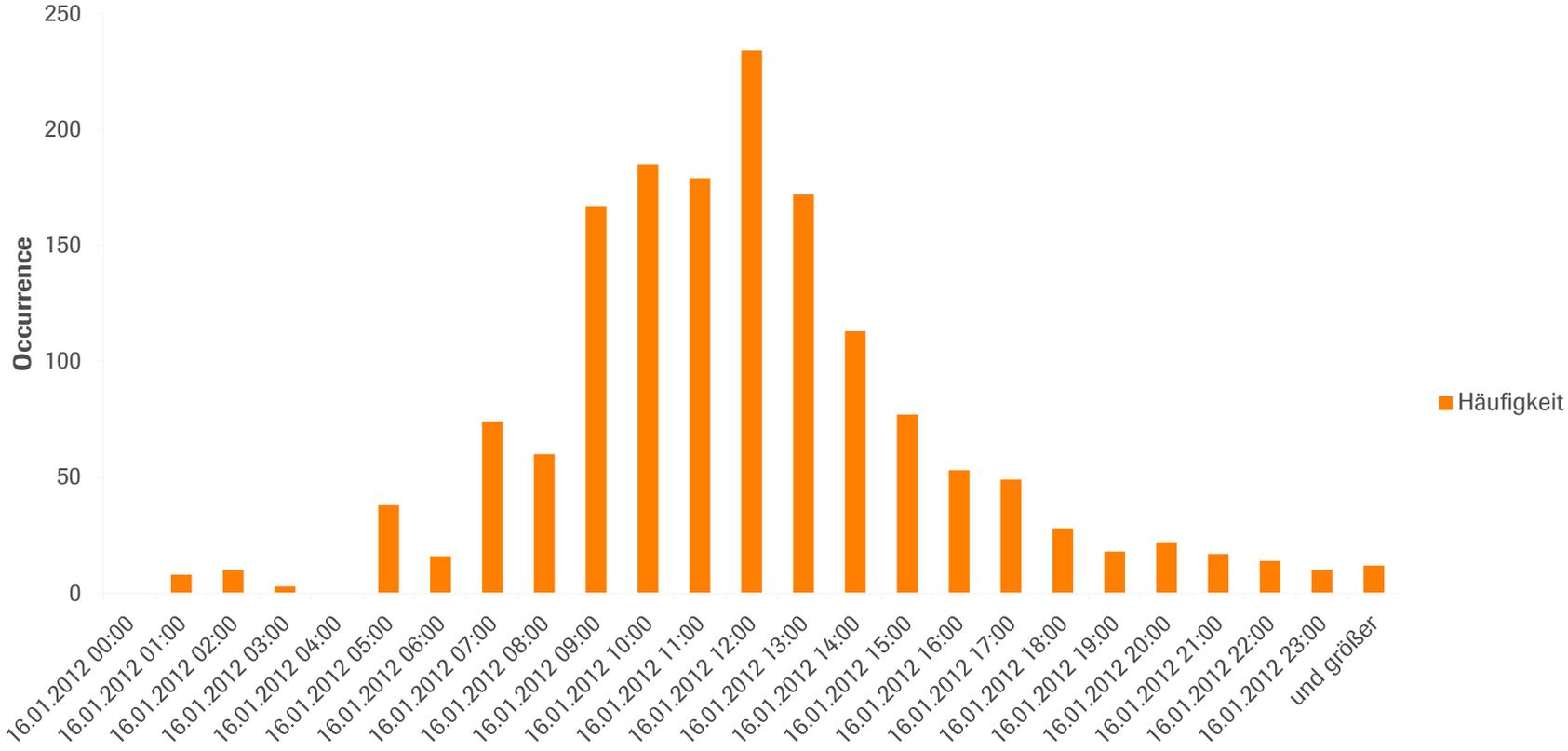


TEST ANALYST

# Live Demo

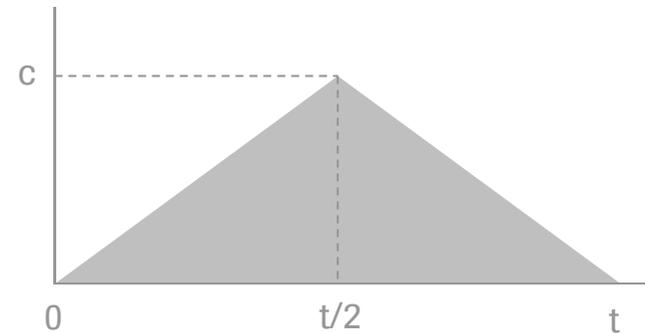


# Narratio (Facts) – Routine Profile in a High Throughput Laboratory



# Narratio (Facts) – Integration of Gaussian distribution function

$$f(x) = \begin{cases} \frac{2c}{t}x, & x \leq \frac{t}{2} \\ 2c - \frac{2c}{t}x, & x > \frac{t}{2} \end{cases}$$

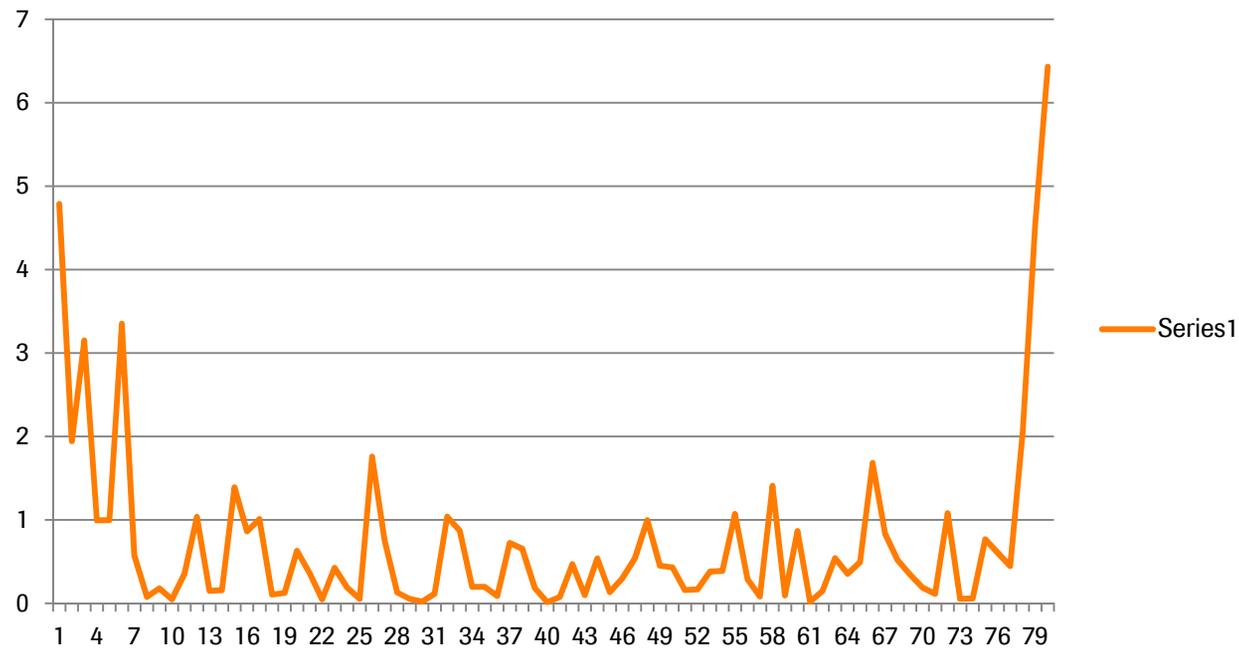


$$F(x) = \begin{cases} \frac{c}{t}x^2 \\ -\frac{c}{t}x^2 + 2cx - \frac{ct}{2} \end{cases}$$

$$M(u) = \begin{cases} \sqrt{\frac{u}{2}}t, & u \leq \frac{1}{2} \\ \left(1 - \sqrt{\frac{1-u}{2}}\right)t, & u > \frac{1}{2} \end{cases} \text{ where } u \text{ is standard normal distributed } (N(0,1))$$

# Narratio (Facts) – Output of Gaussian distribution function

Number of orders= 80, simulated time= 60'



# Confirmatio (Arguments)

- **Maintainability.** Different profiles can be simulated (e.g. Routine Profile or Emergency Profile)
- **Usability.** Simple configuration mask not only for Test Analysts with Computer Science background
- **Efficiency.** Executable as Basic Sanity Test Case to increase test coverage over night
- **Effectiveness.** Customers claim for testing that is closer to their behaviour (not only testing against functional and non-functional requirements)
- **Reporting.** A test result report including the input parameters is automatically generated by Ranorex

# Refutation (Counter-Arguments)

- **Effectiveness** in the case that the LIS Interface is not stable

## **Peroratio (Conclusion)**

**Increase quality** of laboratory instruments  
by simulating test order profiles  
in the alpha phase

# Conclusion

- Go into the direction of Automated Testing as that's the future (cf. Taylor Cowen, 2013)

# Literature

Average is over : powering America beyond the age of the great stagnation /  
Tyler Cowen. – New York : Dutton, [2013]

[http://en.wikipedia.org/wiki/Health\\_Level\\_7](http://en.wikipedia.org/wiki/Health_Level_7)