

Software Systems Centre  
(SSC)



# Characterization of Measurements and Tools in Early Stage Software startups

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# Motivation

- Software startups are newly created companies that aspire to grow fast in extreme uncertainty and are focused on the creation of high-tech and innovative products.
- Generally, start-ups are considered as key drivers of economic growth [1] and contribute significantly to Gross Domestic Product [2].
- However, 80% of software start-ups fail in the first 2 years [3] of their creation.
- Sutton [4] highlights the following causes of start-up failure
  - little or no operating history
  - limited resources: Funds,
  - multiple influences: pressure from investors, customers, partners and competitors impact the decision-making in a company
  - dynamic technologies and markets- operate with disruptive technologies to enter high-impact markets.

# Tackling Failure???

- Measuring- as an activity in mature engineering domain and is becoming more important in software engineering as the demand for software intensive products increases.
- Measures (metrics) are widely used for decision making in mature and start-up software companies.
- Metrics, often visualized with dashboards, are considered crucial
  - to help software start-ups focus on the right aspects during the first years
- However, software start-ups are known to differ from established companies in many ways,
  - as they face a number of additional challenges that influence their technical and business processes.

# Start-ups in the bigger frame



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Eureka???

# Overarching Objectives

1. To understand the use of measurements and perceived benefits of measurement in software start-ups in the emerging start-up ecosystem of East Africa. **(Study 1)**
2. To identify key requirements for measurement dashboards for early software start-ups for use in monitoring their daily health and how start-ups expect the dashboards to benefit them. **(Study 2)**



# Study Methodology

- We used semi-structured interviews and developed two instruments to meet the two key objectives
  - We conducted two studies Study 1 and Study 2.
- In both studies, we selected startups ranging from those that provide software as a service/support tool business processes to those that produced software as product.
- We firstly performed a multi-case study on 19 software start-ups based in hubs in Kenya and Uganda (2018).
- For the second study, we interviewed 36 software start-ups in Uganda and Kenya
  - to identify and categorize requirements for measurement dashboards.
- We transcribed and analyzed both sets of interviews using content analysis technique.

# Key Results: Study 1 (measurement use)



1. Early stage software start-ups in the nascent East Africa ecosystem are measuring some of their technical and business aspects
2. Early stage start-ups were seen preferably use business and product metrics
3. There was no evidence of use or wish for design metrics (which exist in large software organizations)
4. The older start-ups were shown to also wish for project-oriented metrics.
5. Organizational metrics were the least used metrics in the early start-ups in East Africa
6. Start-ups showed considerable expectations in the benefits of measuring although a number of them perceive their measuring activities as not enough.



# Key Results: Study 1 (Lean-startup Framework)



## Comparative Results using the Lean-startup Framework

1. Early start-ups in East Africa can largely be categorized using a lean start-up framework by Croll and Yoskovitz[4]
2. Early start-ups also use some of the known lean start-ups metrics,
3. However, some metrics are not captured by the lean start-up framework.
4. The lean start-up framework also fails to categorize some types of software start-ups that exist in East Africa.
  - Fintechs start-ups, and those that provide Software Development as a Service.

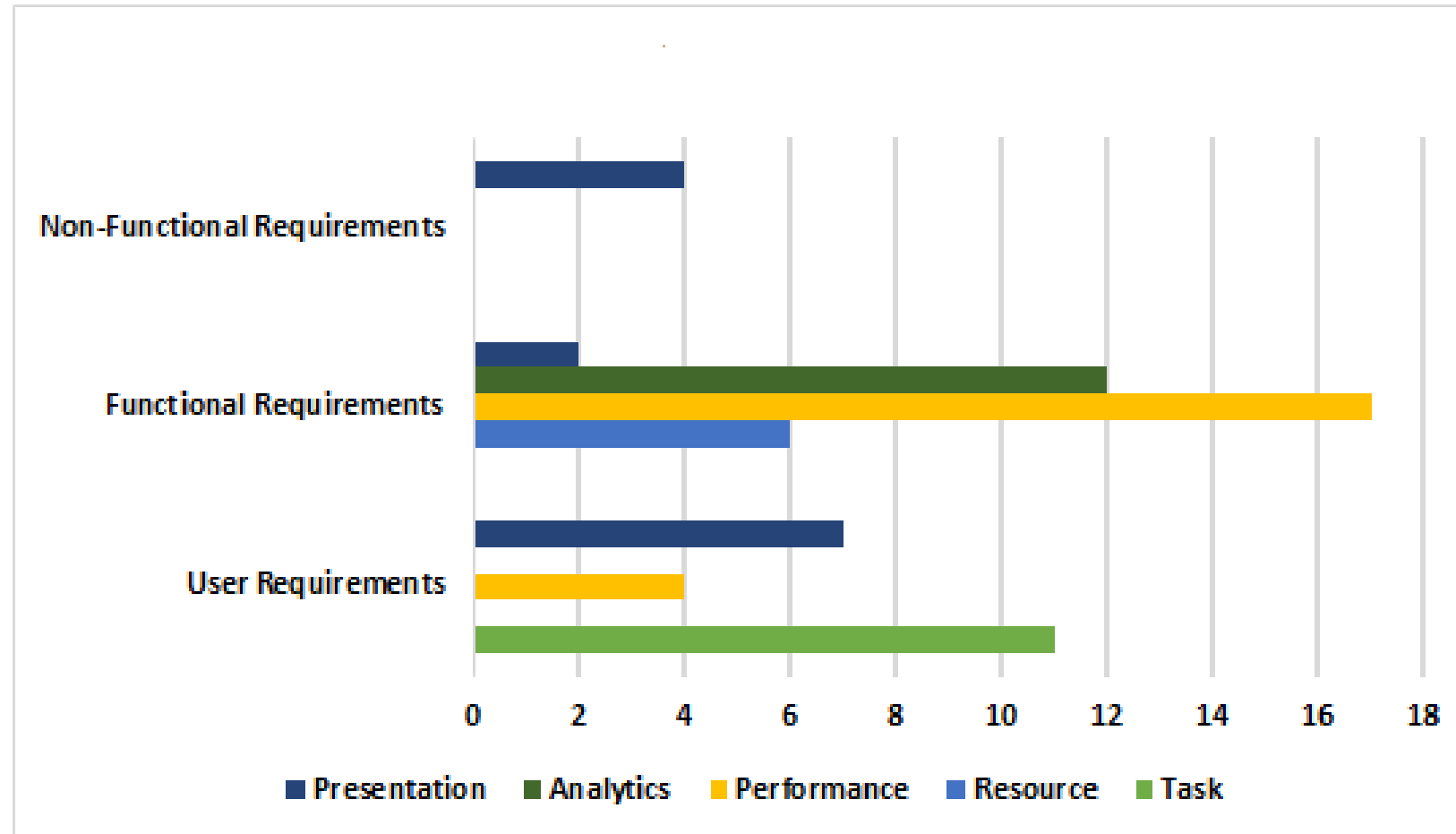


# Key Results: Study 2 (Measurement Dashboard



- **most start-ups required dashboards to support user and functional requirements for performance.**
  - revenue growth, performance tracking/monitoring for staff, showing/tracking work/project/company progress
- **Also, wanted the dashboards to support presentation for the measurements.**
  - visualizations (color coding, graphs, charts),
  - visualizing specific measures (staff productivity, areas of failure), reminders
  - and showing of areas of start-up focus

# Key Results: Study 2 (Measurement Dashboards)



# Key Results: Study 2 (Measurement Dashboard)



- We grouped benefits into five broader themes that (**resources, team, performance, product and investment**).
- **Most start-ups (67%) expected and /or experienced performance-related benefits.** Like project monitoring/tracking, knowing of current project/start-up status and insight.
  - Possibly because start-ups are focusing on two main chasms (problem/solution fit and product/market fit)
- **There was wide variety of benefits expected by start-ups with respect to resources, teams, product, and investment.**
  - Pointing to either lack of known measurement standards, or common knowledge on measures in different types of start-ups.



## Key Limitations to the study

- The main threat was asking the wrong or vague interview questions in study 1 and study 2.
  - Mitigation: In both studies, we iterated the interview guides between the three authors and further tested it with four start-ups.
- External validity: **Study 1 focused on a specific an emerging ecosystem, namely East Africa.**
  - It is difficult to predict to what degree our findings can hold for software start-ups outside this regional context, e.g. in Europe.
- (Study 2)**The comparison of dashboard requirements for performance management with Finnish businesses**
  - May have made some assumptions in the contexts.
  - Mitigation: We used a two dimensions mapping for the purpose and features. We believe that these two dimensions helped us to closely map the found dashboard requirements.



# Conclusion

## Study 1:

- Start-ups are using a number of business and product-oriented metrics.
- Furthermore, we found no evidence on the use of design-oriented metrics.
- Nonetheless, start-ups have considerable expectations on the benefits of measuring.
- Finally, metrics found in this study partially differ from metrics used in start-ups in developed countries.

## Study 2

- Start-ups require dashboards mainly for performance aspects and to show status of their progress by visualizing the measures.
- Start-ups expect mainly performance related benefits on using dashboards- which is similar to other businesses.
- Some of the dashboard requirements East African start-ups could not be sufficiently mapped to features used in dashboards in Finnish companies.



## Publications from the Studies

- Kamulegeya, G., Mugwanya, R. and Hebig, R., 2018. **Measurements in the Early Stage Software Start-ups: A Multiple Case Study in a Nascent Ecosystem.** Foundations of Computing and Decision Sciences, 43(4), pp.251-280.
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**THANKS A LOT FOR YOUR TIME:  
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