

Modern methods of fall risk prediction

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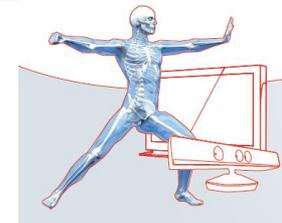
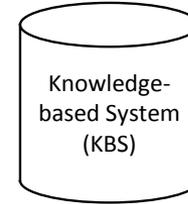
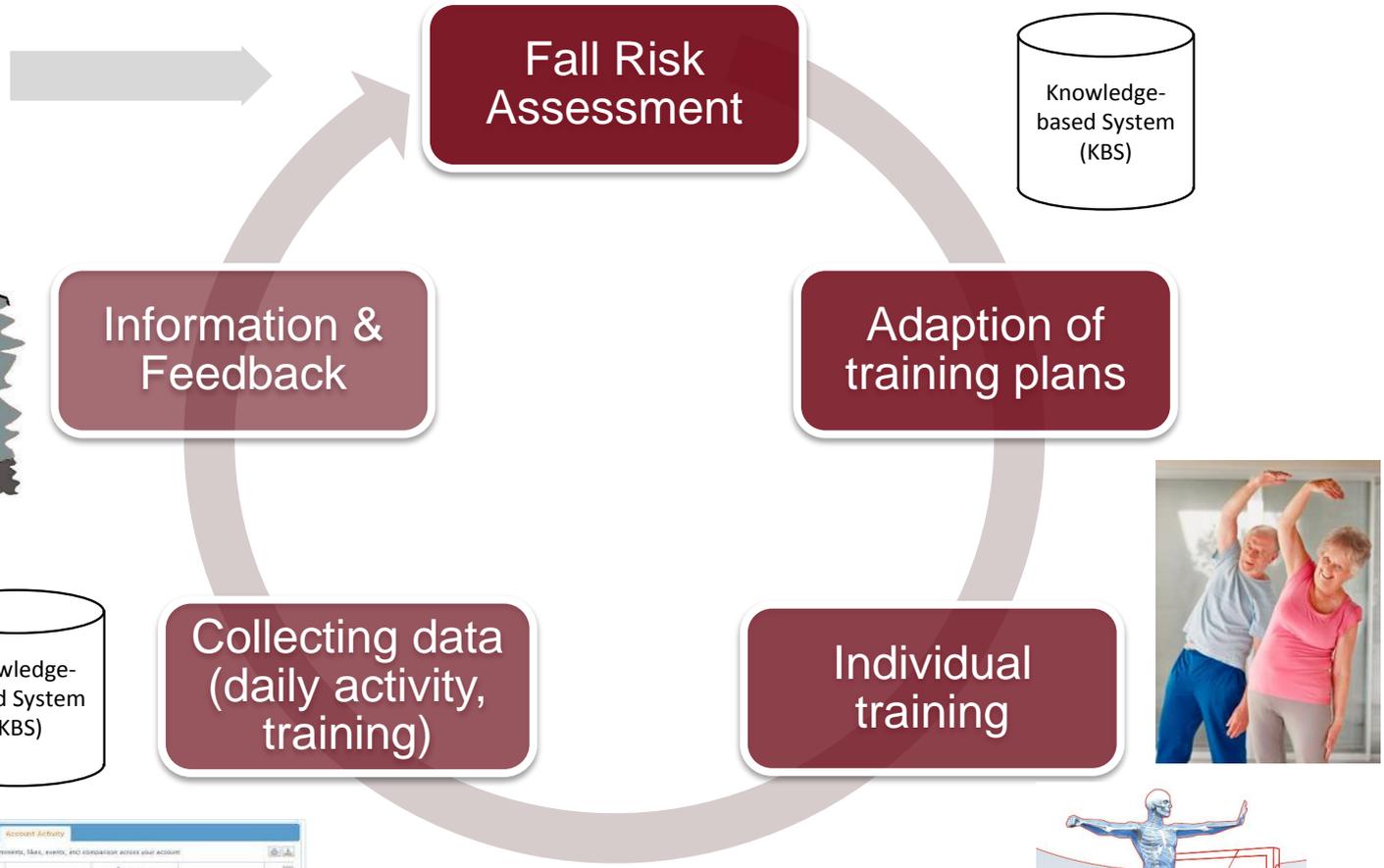
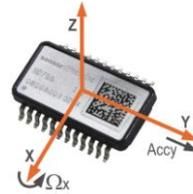
How can we prevent falls?

iStoppFalls

- ICT-based **S**ystem to **P**redict and **P**revent **f**alls at home
- Risk Assessments & Exercises are done by older adults independently in their own homes
- EU-project (FP7)
- 3-years duration (until 2014)
- Consortium
- The project has received funding from the European Community (grant agreement 287361) and the Australian Government.



How does it work?



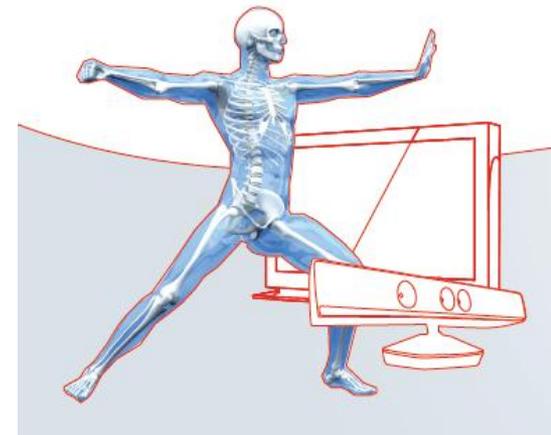
How can we predict falls?

Common approaches in fall risk prediction

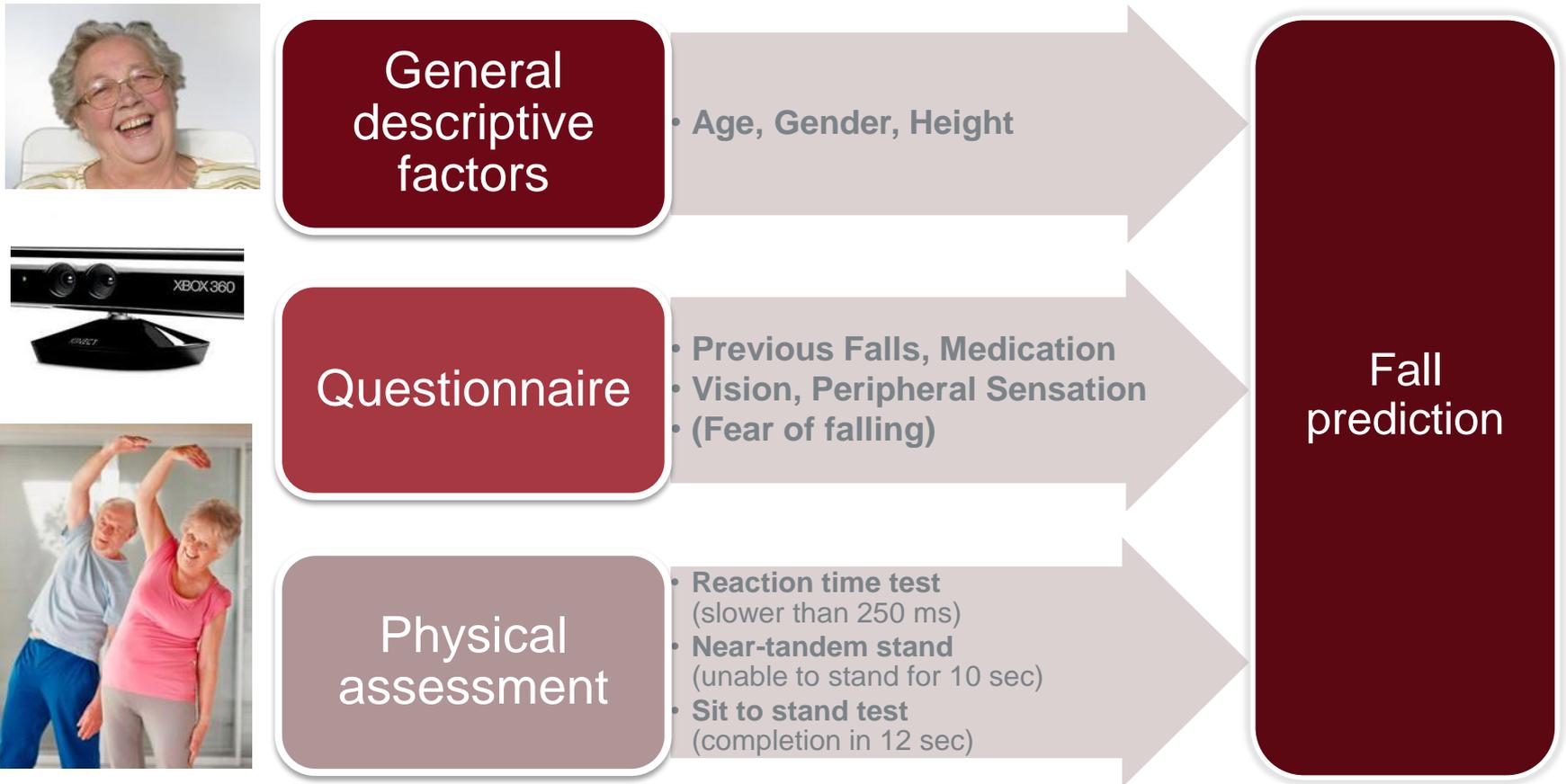
- Assessments are conducted in a clinical environment
- Supervised by a physician
- „One-time“ snapshots → long intervals (annually)
- Time consuming for the patient and the physician
- Cost intensive

Modern methods of fall risk prediction

- Risk assessments are done by older adults independently without supervision
- We will use sensor technologies to measure the risk factors:
 - Microsoft Kinect
 - Wearable accelerometer in a necklace (PHILIPS)
- Development:
 1. Fall risk self-assessment
 2. Risk assessment tool



Fall Risk Assessment



Risk assessment tool

- Aim: Identify **high-risk fallers**

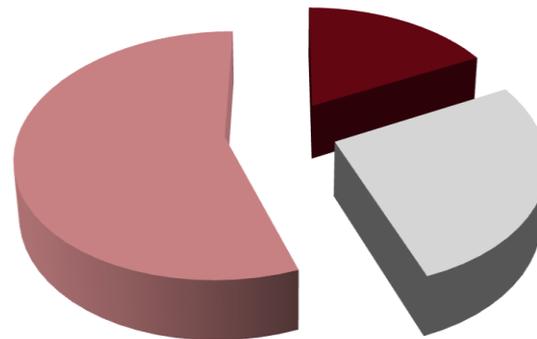
- Data from 372 community-living participants (aged 70 to 90)
 - Monthly fall calendars
 - 1-year follow-up period

- Preliminary prediction model
 - Cost-sensitive meta classifier
 - Naive Bayes

Who are the high-risk fallers?

Preliminary findings

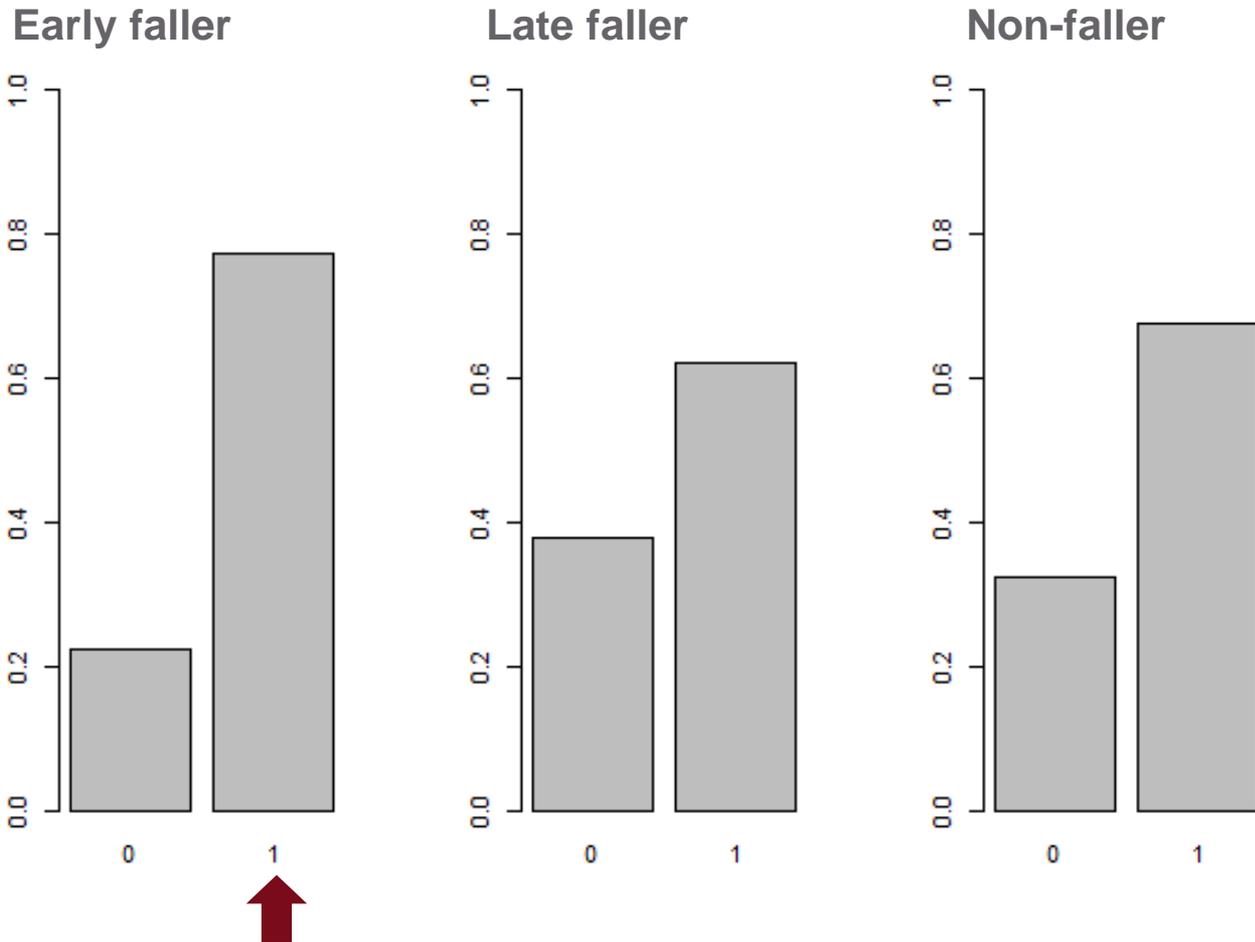
- Early fallers: reported a fall in the first 3 months
- Late fallers: reported a fall after 3 months in the study
- Non-fallers: reported no falls (12 months)



■ Early faller ■ Late faller ■ Non-faller

Preliminary findings - Questions

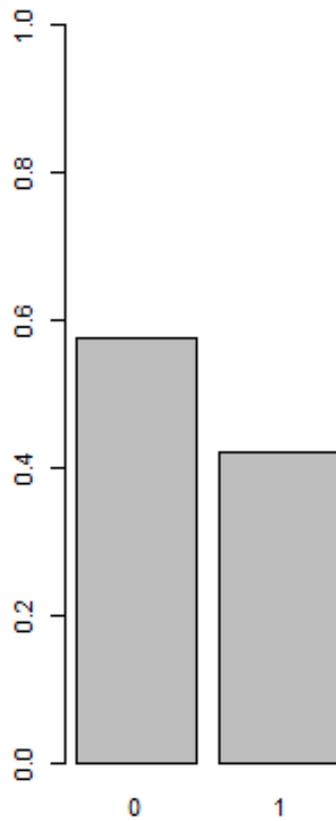
“Do you take 4 or more medications per day?”



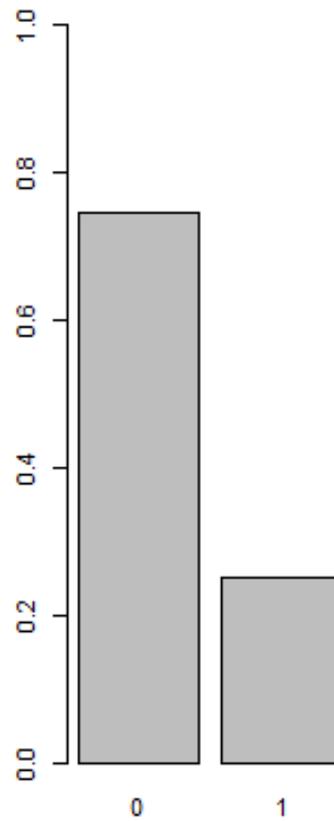
Preliminary findings - Exercises

Mean reaction time slower than 250 ms?

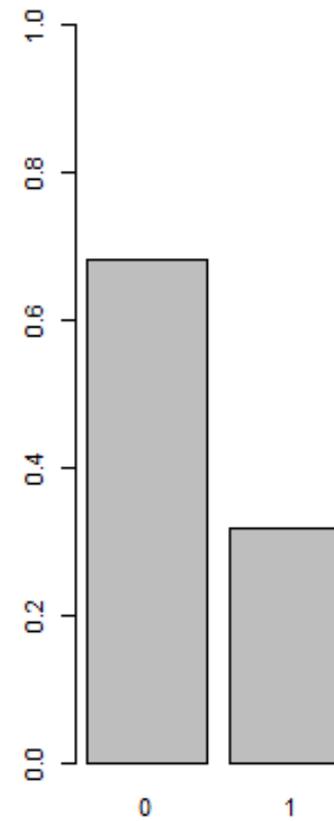
Early faller



Late faller



Non-faller



Preliminary results – Risk assessment tool

- Cost-sensitive classifier + Naive Bayes algorithm
- 10-fold cross-validated

		Actual outcome		
		Early faller	Non-faller	Total predicted
Assessment tool prediction	Early faller	47	44	91
	Non-faller	18	163	181
	Total actual	65	207	

Sensitivity = 72% **Specificity = 79%**

ROC AUC = 0.773

Conclusion and Outlook

- Developed a fall risk assessment & prediction tool
- High-risk (early) fallers were more likely to
 - have previous falls
 - take more than 4 medications
 - have painful feet
 - scored worse on the 3 performance measures
- Trend analysis of the fall risk over time
- Further validation of the risk assessment tool

Thank you!

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