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Ultrasound Guided Navigation: Application Example in MITK

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dkfz.

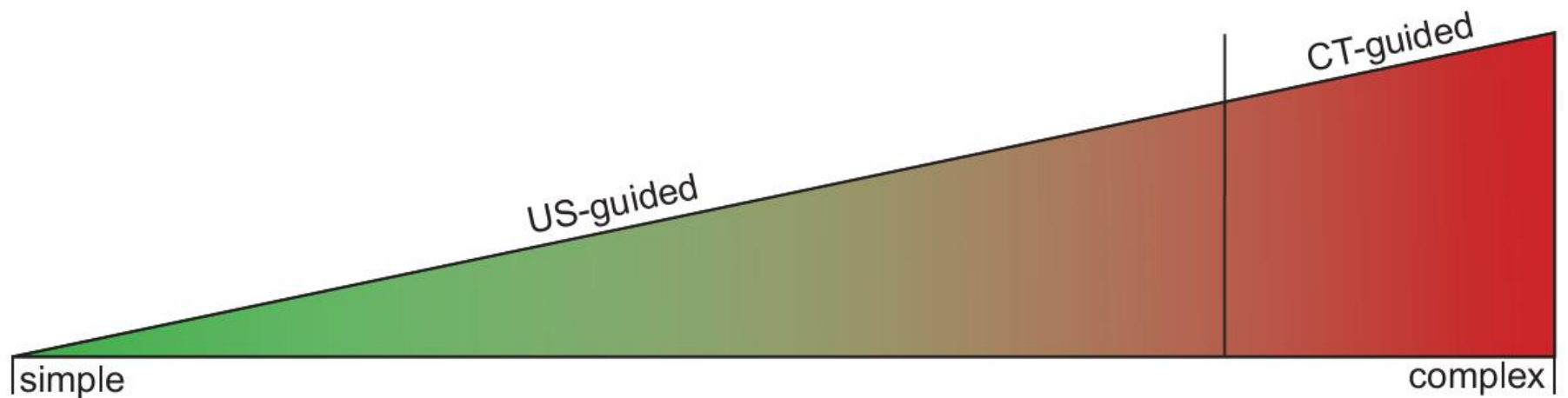
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50 Years – Research for
A Life Without Cancer

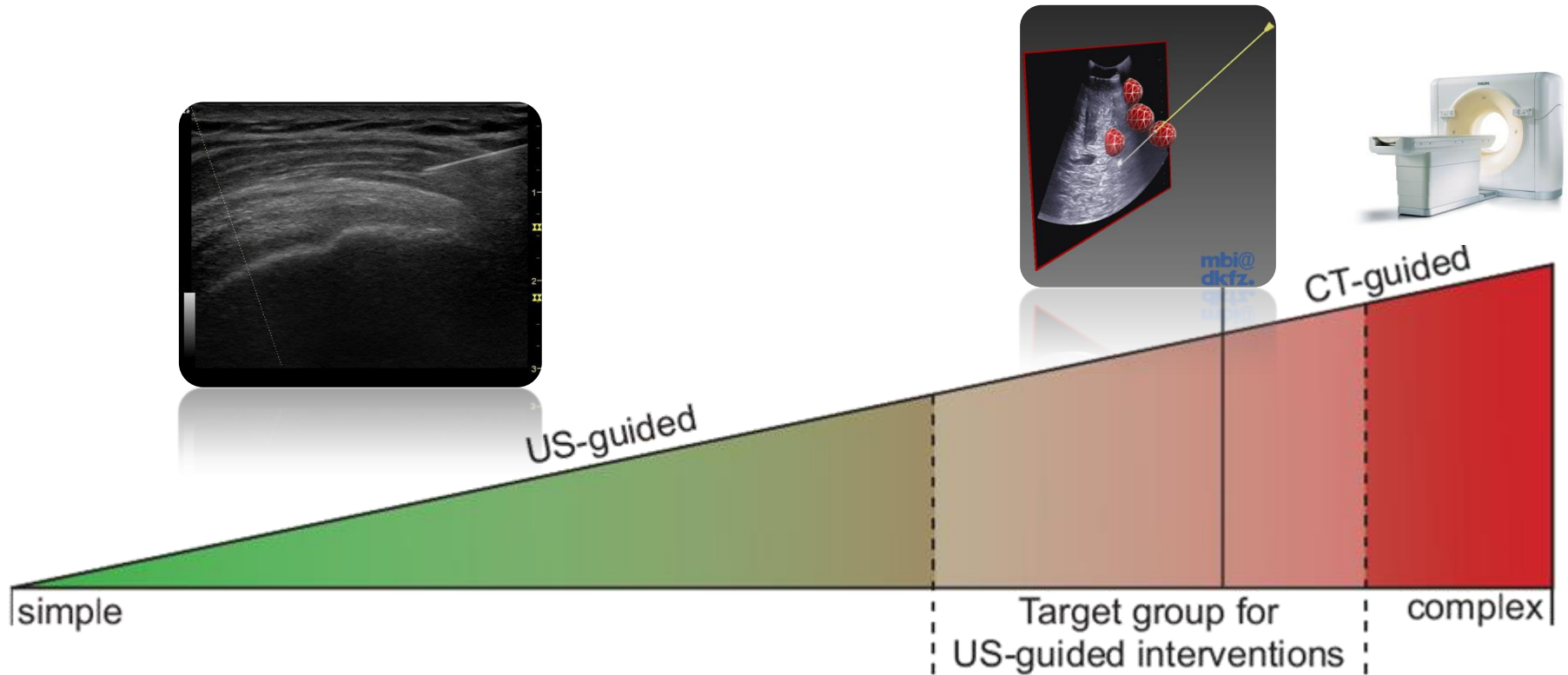
Motivation

- Assist in difficult US-guided interventions
- Reduce amount of CT-guided interventions



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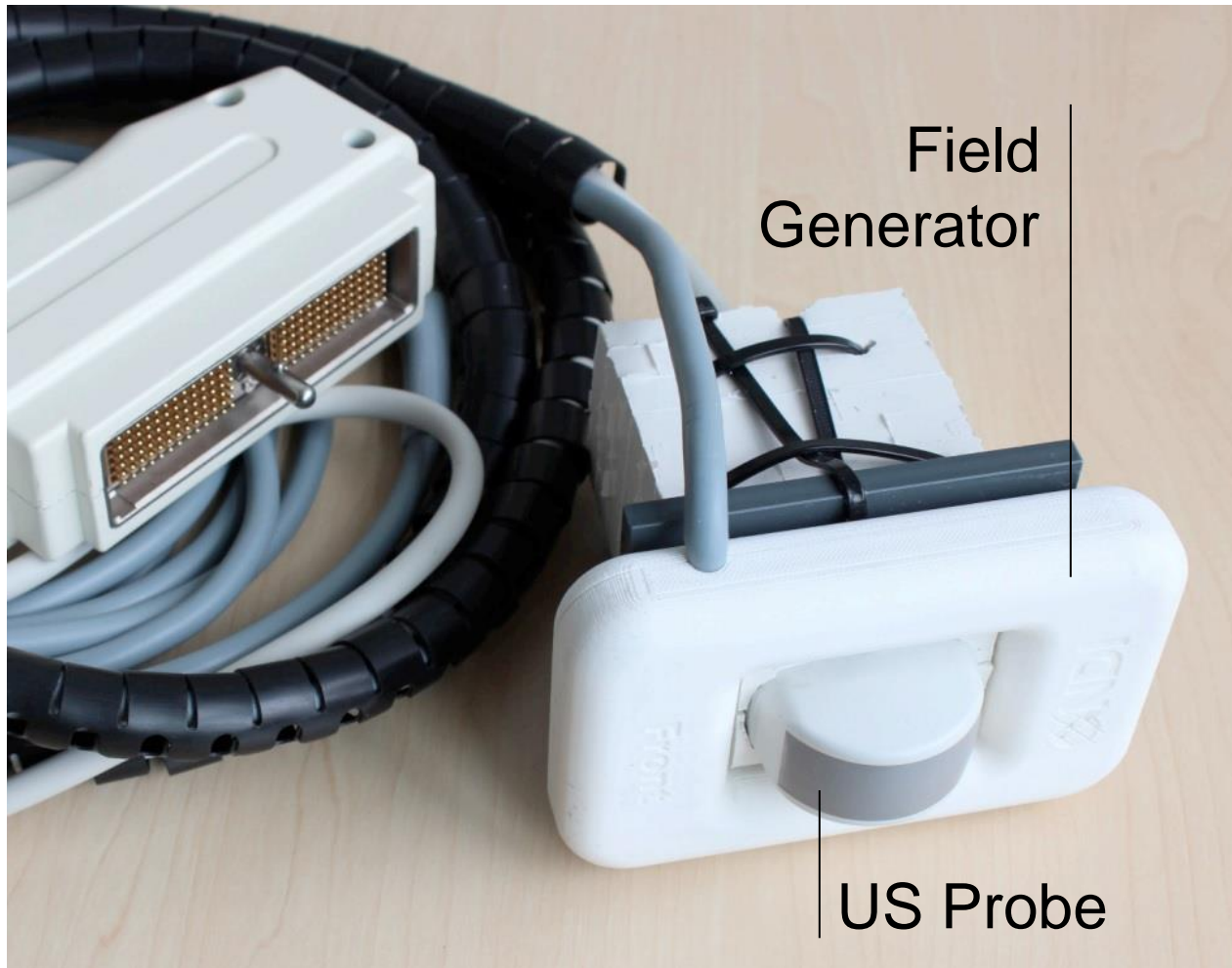


New Mobile & Compact Field Generator



(First prototype: Northern Digital Inc. (NDI) 2011)

EchoTrack: A Combined Modality



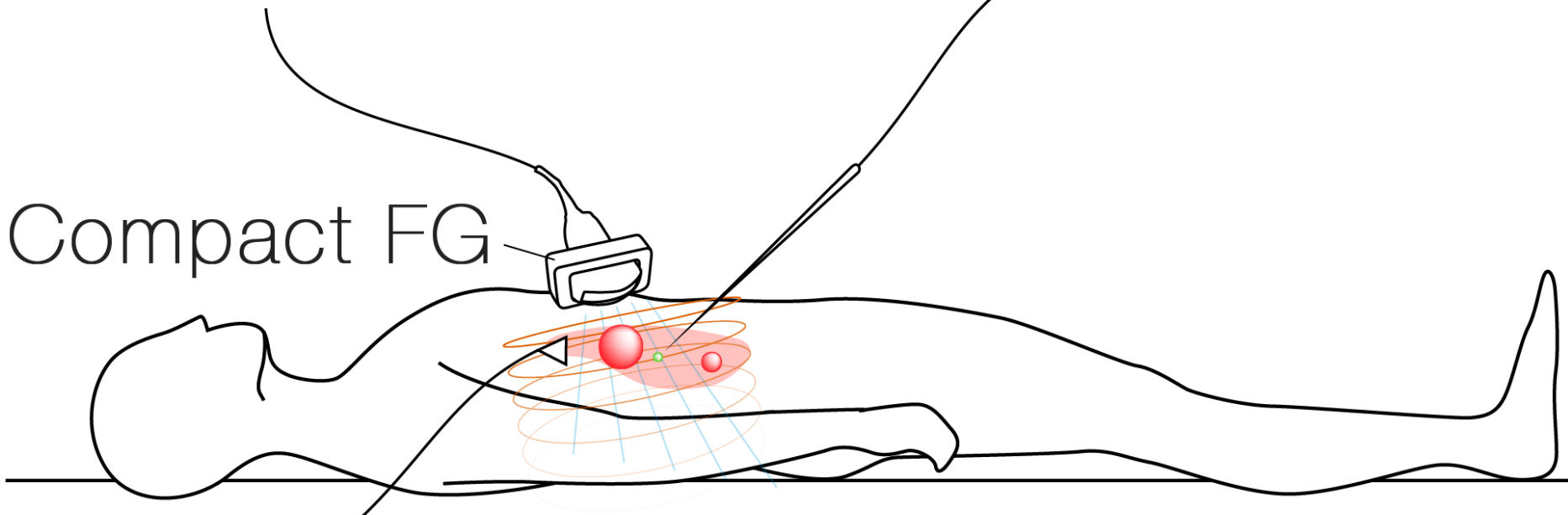
Setup

Ultrasound probe

Needle

Compact FG

6DoF sensor



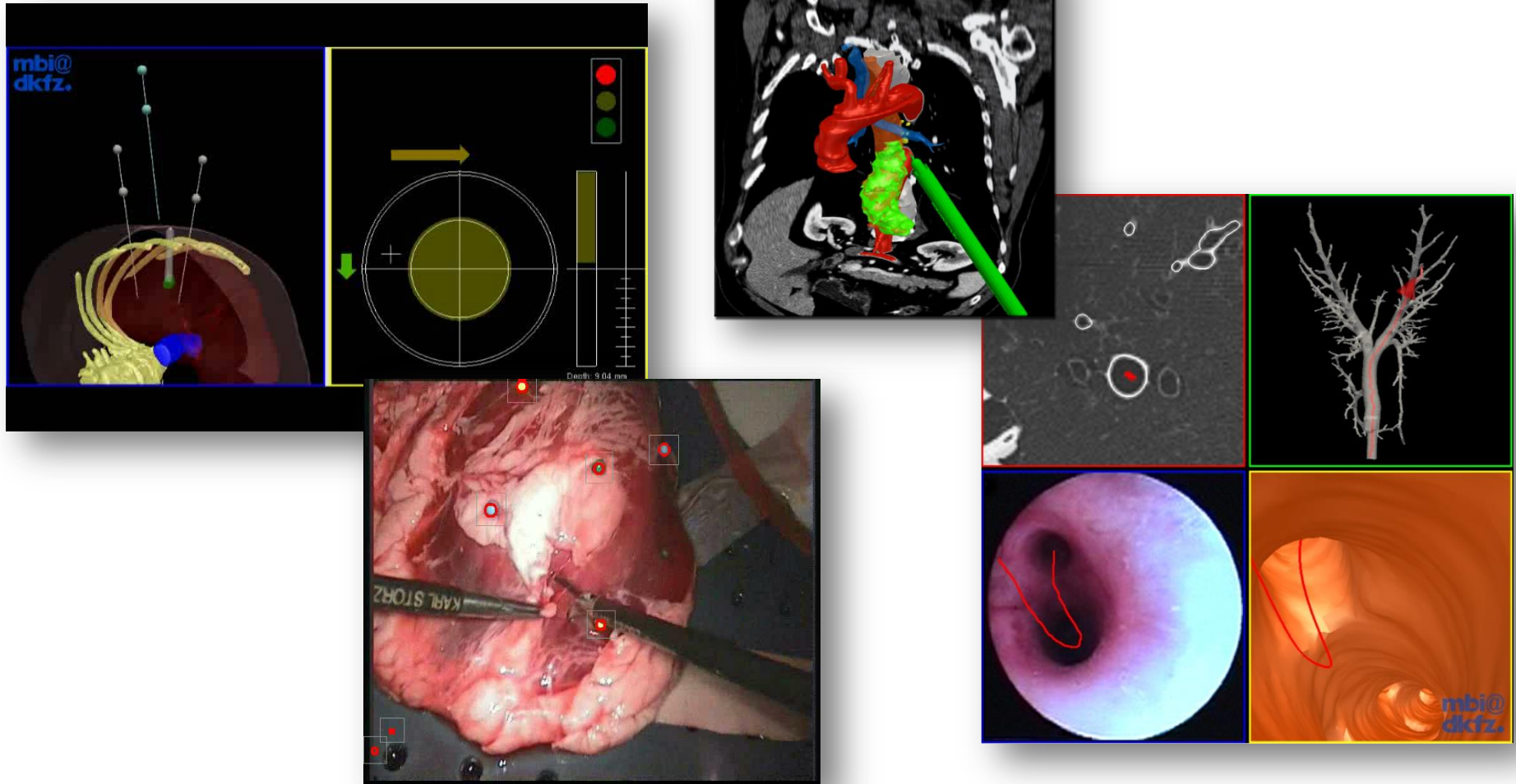
How do we implement this with MITK?



Implementation

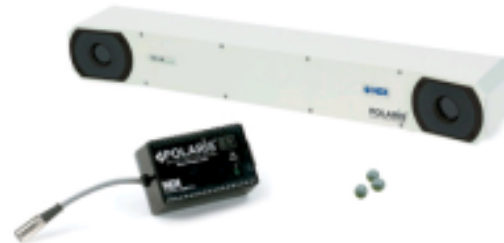
1. Instrument Tracking MITK-IGT
2. Ultrasound Imaging MITK-US
3. Reusability Microservices
4. Navigation Software MITK Plugin

MITK-IGT: Image Guided Therapy with MITK



Requirements

- Hardware control of tracking systems



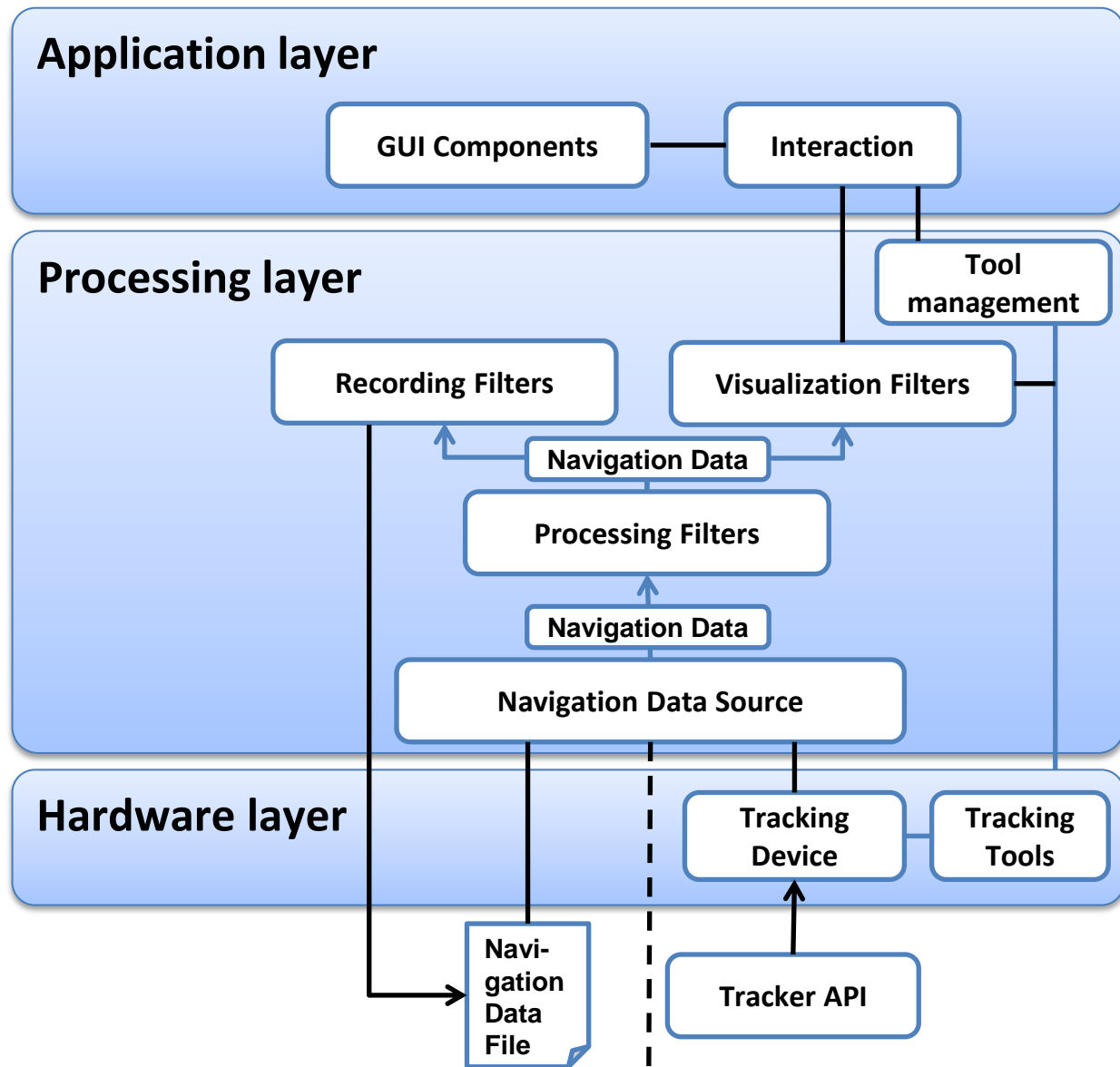
- Real-time localization of multiple objects



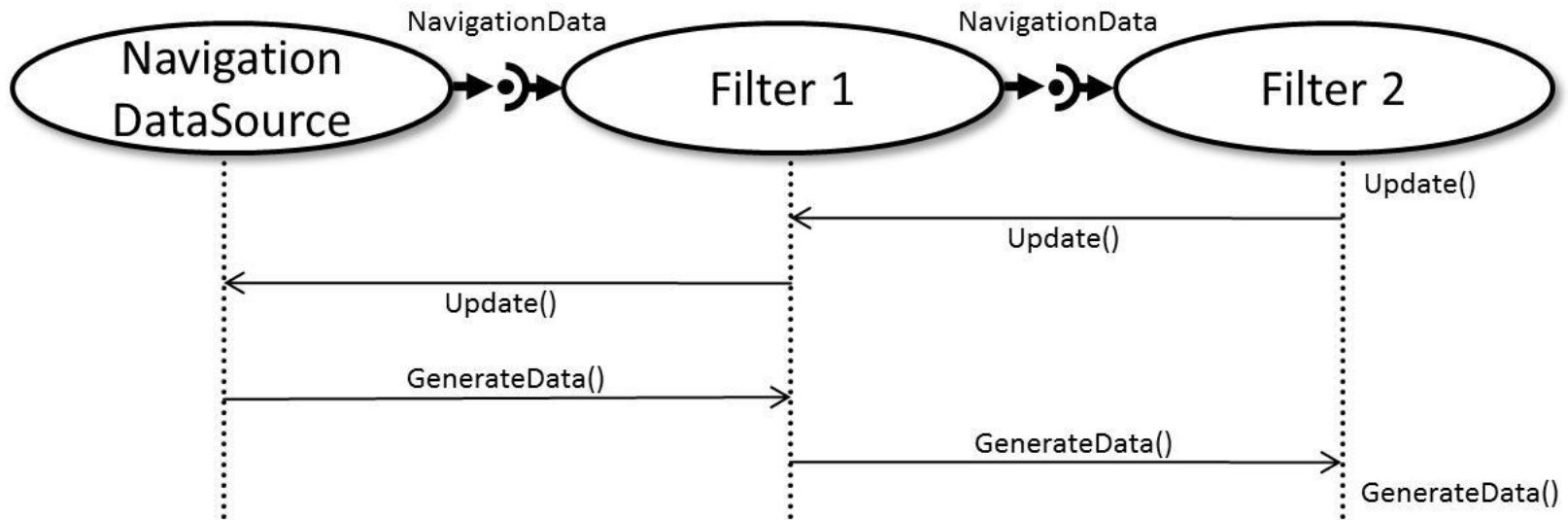
Application development

Recording, Processing and Visualization of tracking data

Control of tracking devices



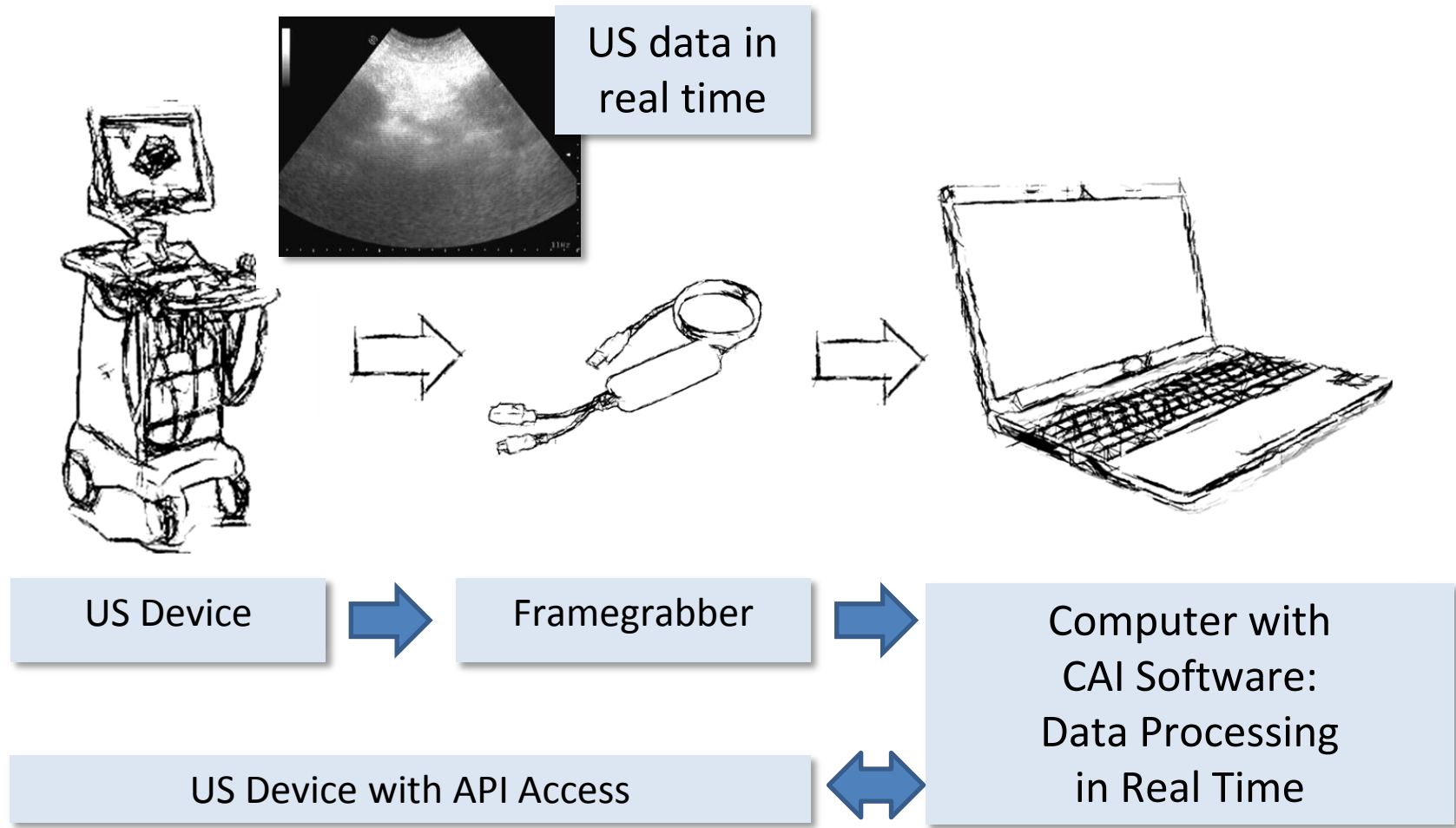
IGT Filter Pipeline



Demonstration

- Connect to NDI-Polaris
- Tool Management
- Tool Visualization
- Tracking Instruments

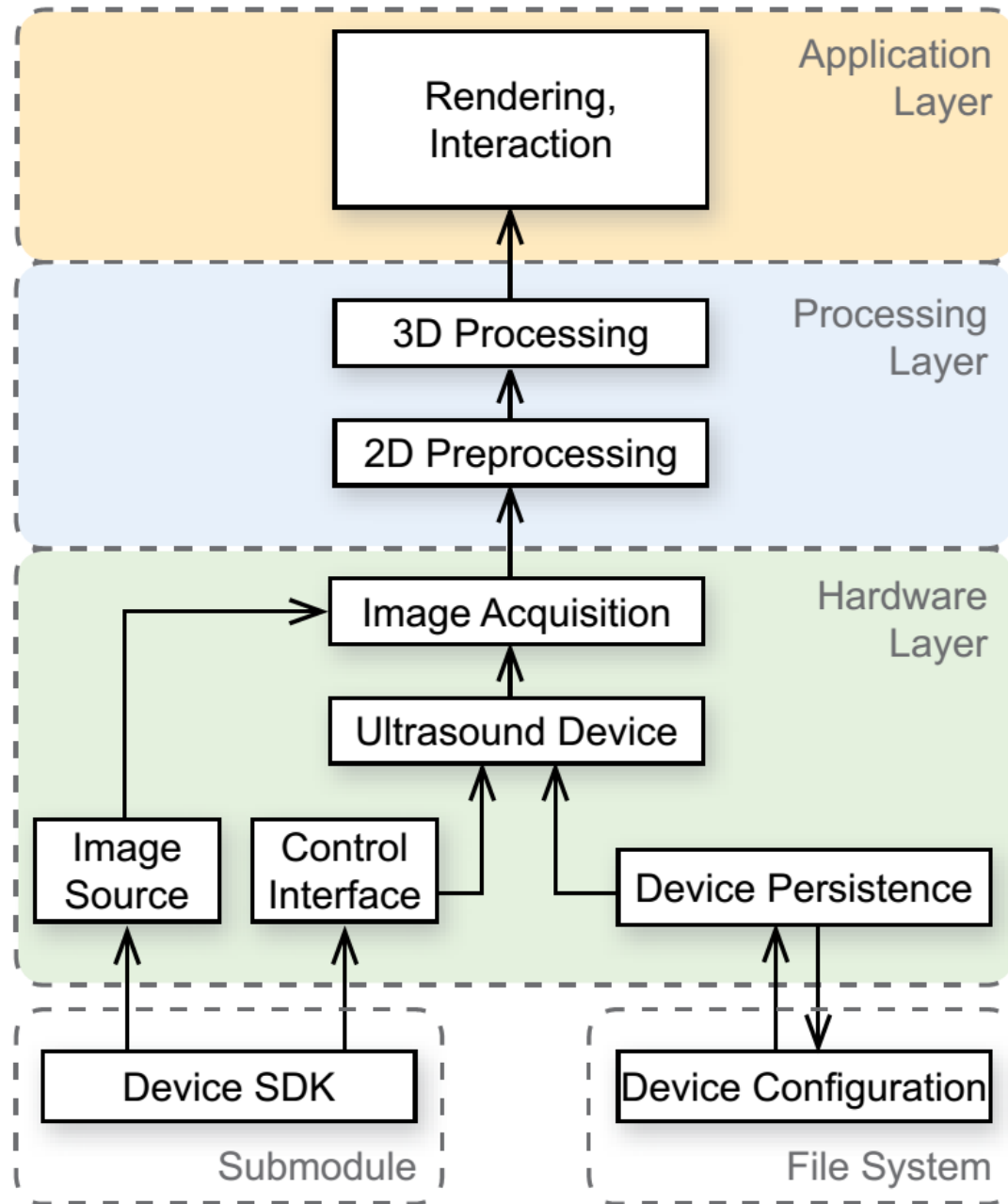
MITK-US: Ultrasound real-time imaging



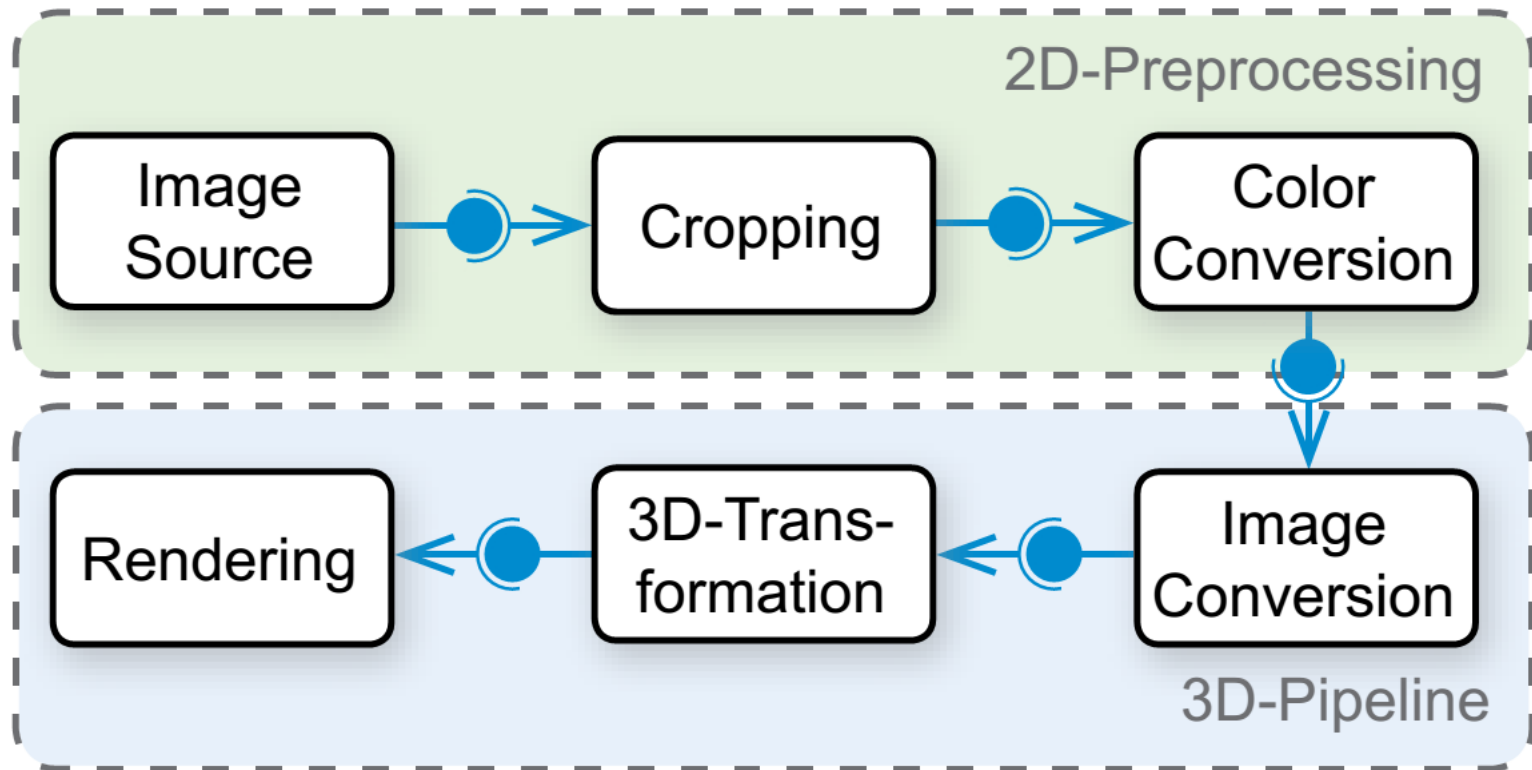
Application development

Recording and Processing of US images

Image acquisition and device control



Ultrasound Imaging Pipeline



Demonstration

- Connection to API-device
- Image acquisition
- Device control
- Measurement using MITK

**How do we
bring it
together?**

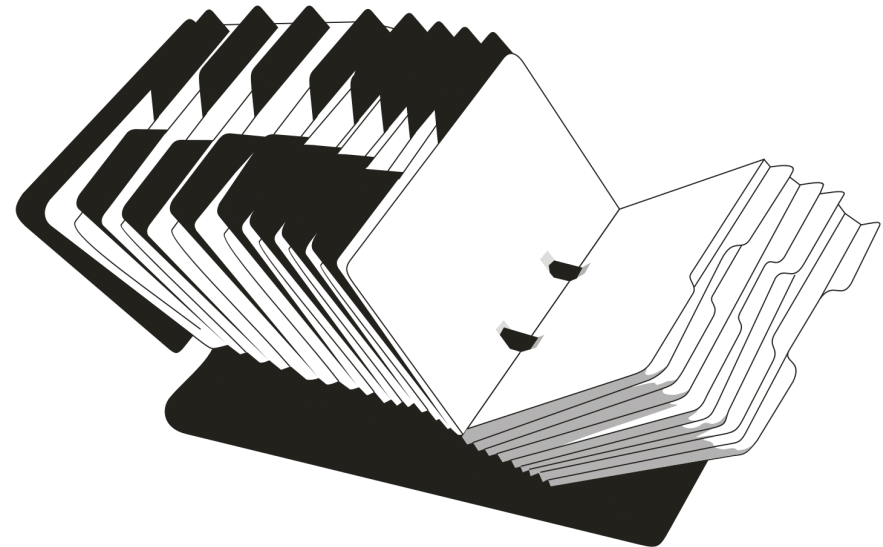


Reusability

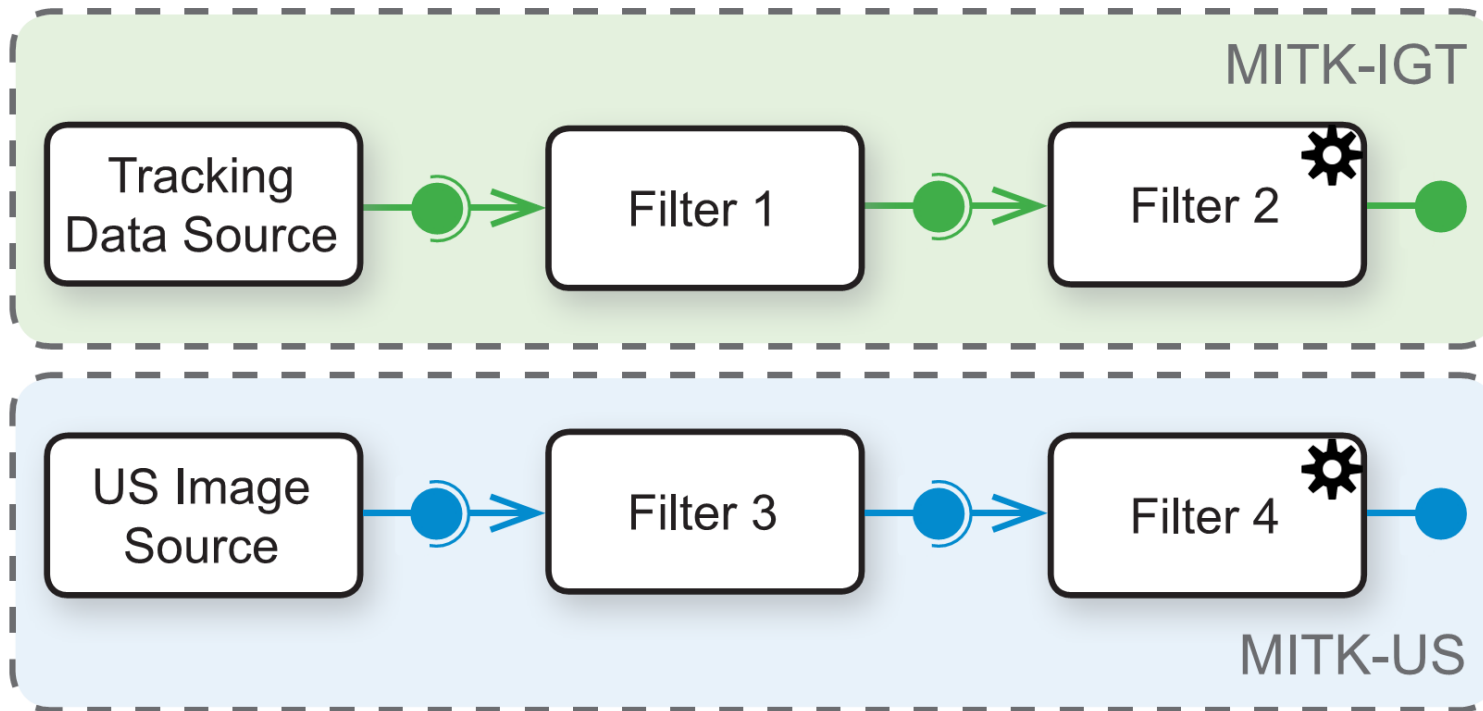
- We could reuse on the level of...
 - Classes `#include <mitkUSDevice.h>`
 - UI-Components `Widgets`
 - Instances **Microservices**

Microservice Concept

- Register instances with service registry
- Other classes can query registry
- Idea: Make filter a Microservice!

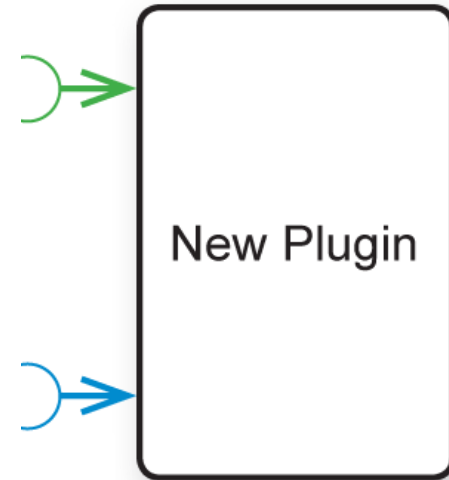
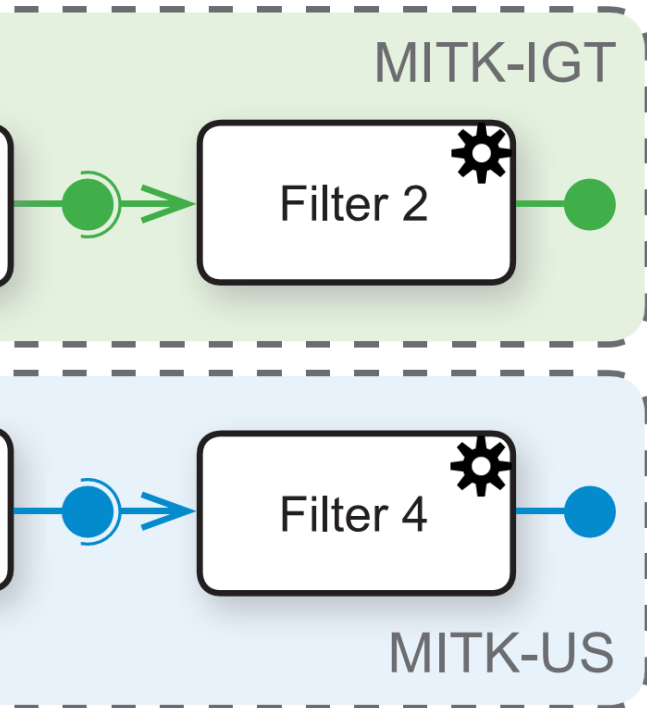
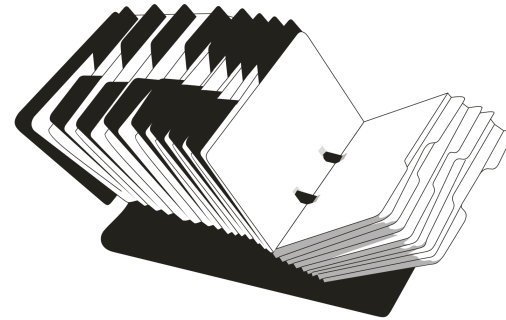


Reusing Pipelines with Microservices

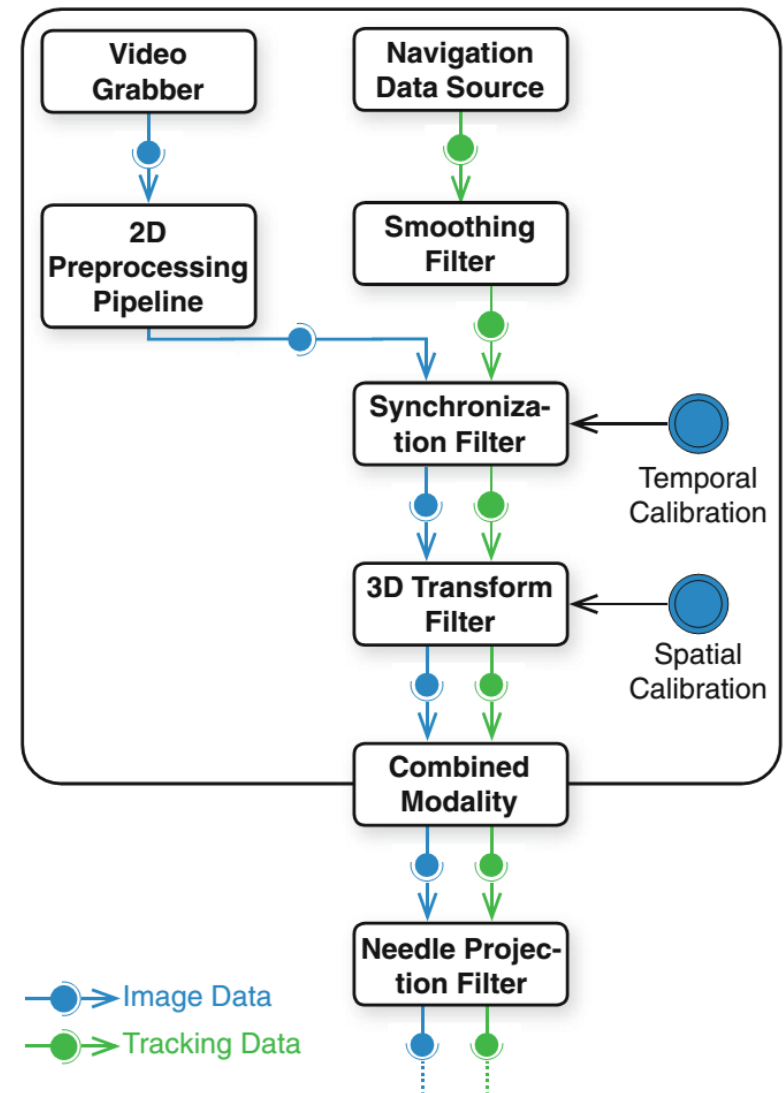
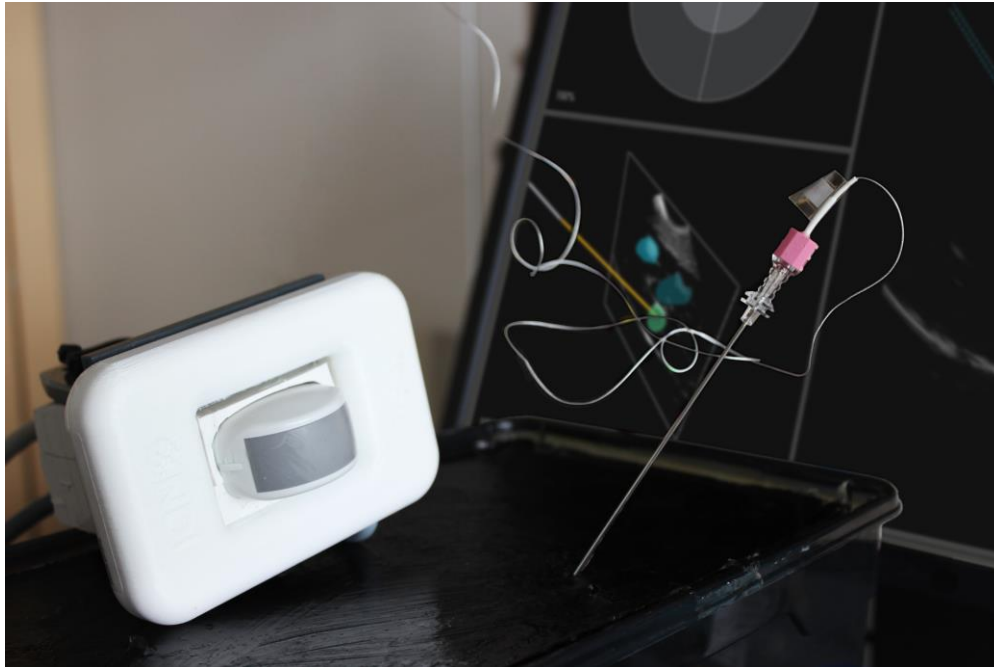


```
myTrackingDevice->RegisterAsMicroservice();  
myUltrasoundDevice->RegisterAsMicroservice();
```

Reusing Pipelines



Navigation System



Simultaneous US-Imaging and Needle Tracking in Action!

Summary

- MITK-IGT provides tracking
- MITK-US provides imaging
- Microservices provide platform for reusability
- Navigation takes advantage of full workflow for both modules

Thank you for
your attention!

Further
information
on www.dkfz.de

dkfz.

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