Understanding the human factor by making understandable visualizations

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Abstract

Architecture Frameworks offer many representations to visualize views. Unfortunately, many of these representations focus more on being complete and precise, rather than being understandable. Many of the stakeholders do insufficiently understand these representations. The designers at the same time do insufficiently understand the human factors in the system context, since most of these have been abstracted away.
We show that simple diagrams in, for instance, space and time help to bridge these two worlds and help both stakeholders and designers. We will illustrate this by examples from Magnetic Resonance Imaging.

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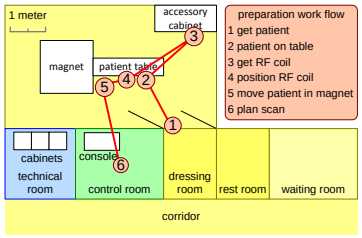
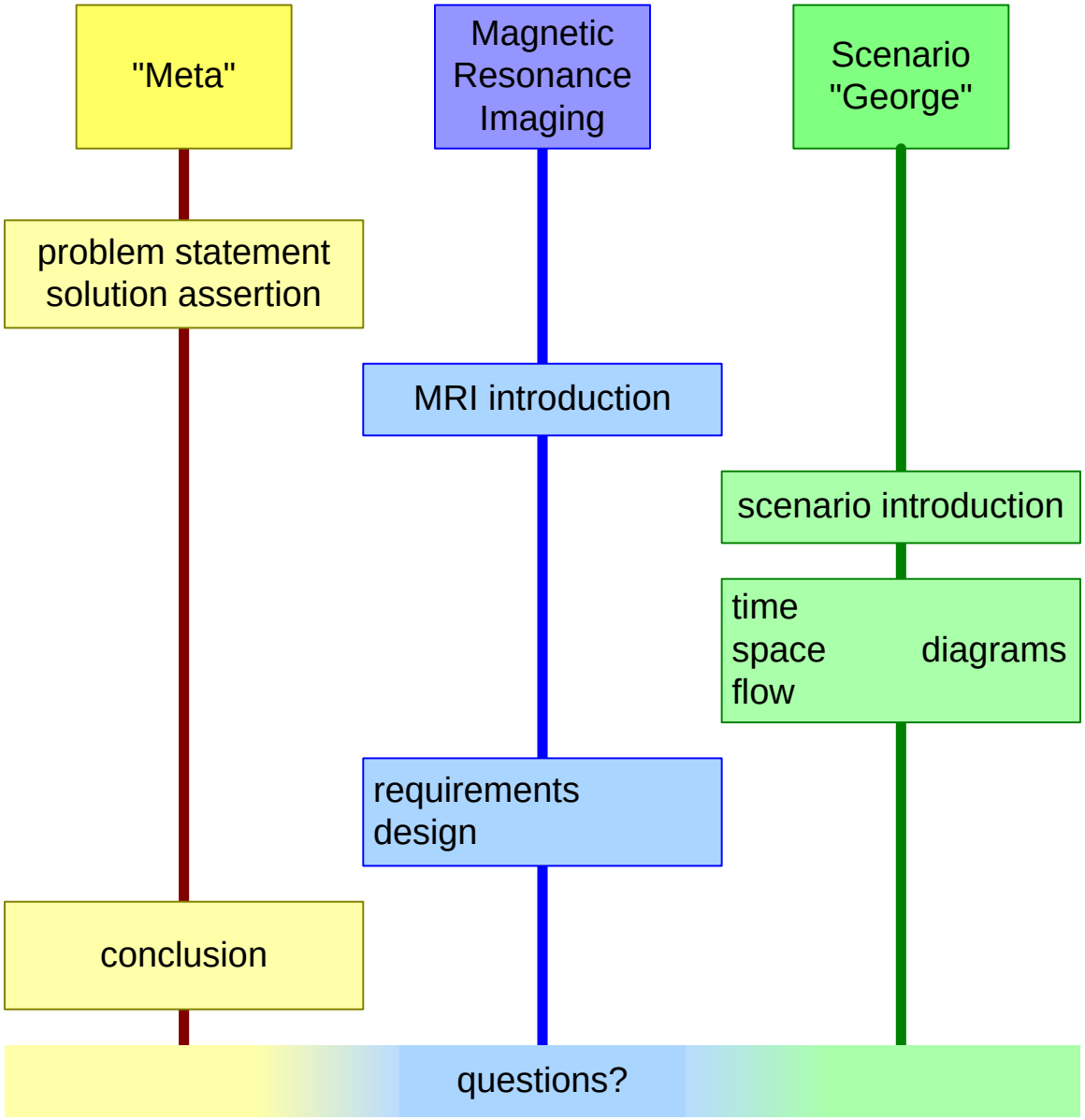
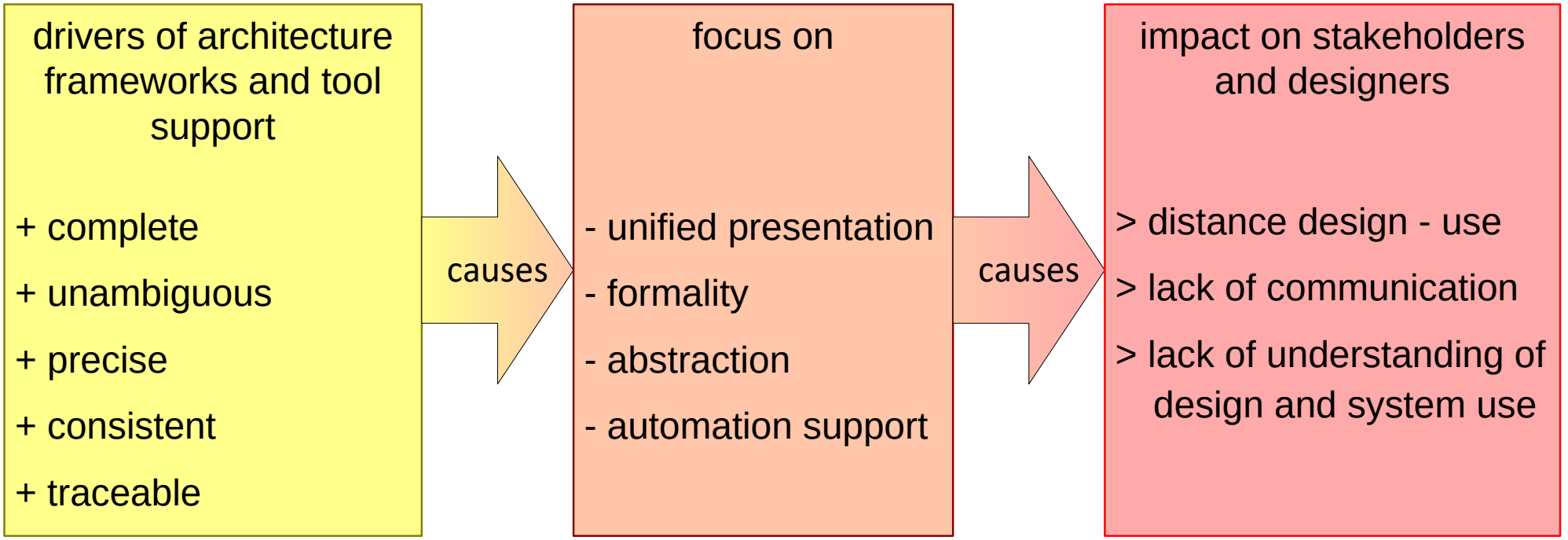


Figure Of Contents™



Problem Statement



Today's Architecture Frameworks

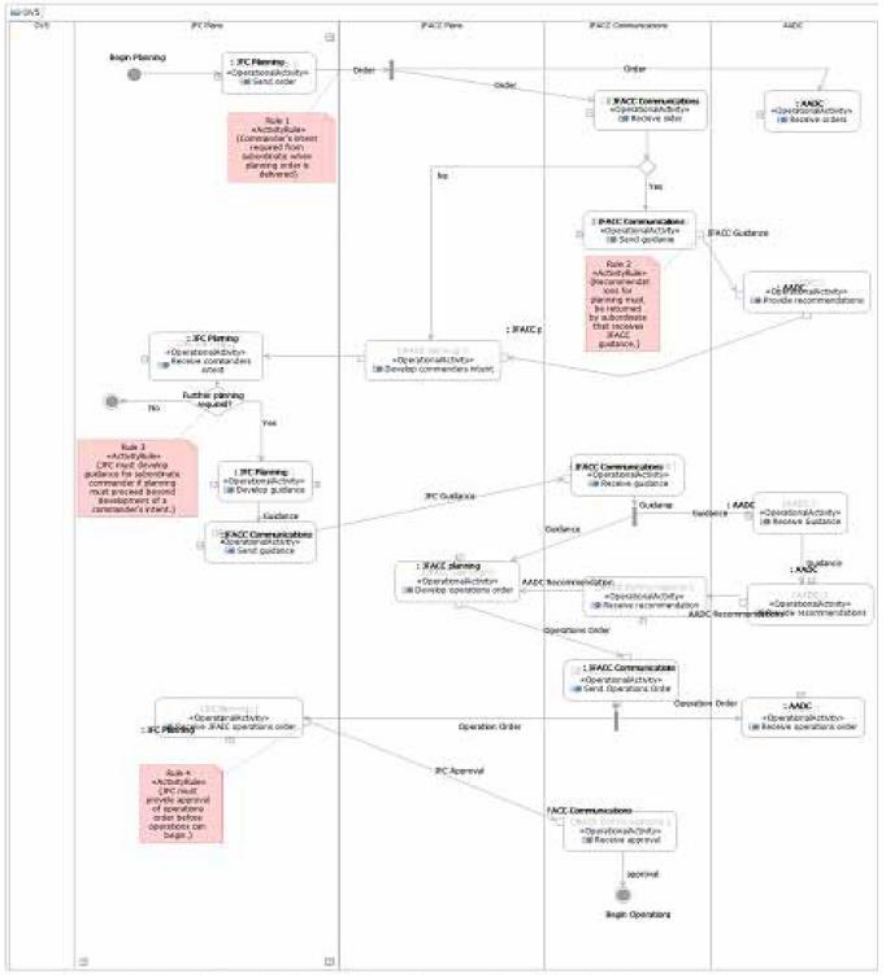


Figure 4 - Operational activities and behavior of the nodes supporting JFACC planning

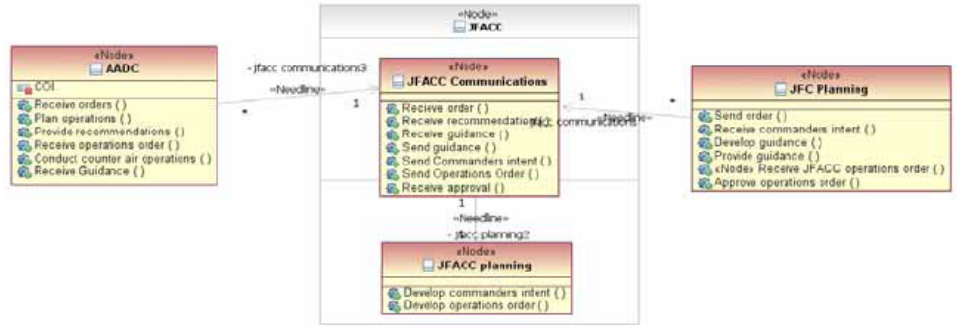


Figure 2 - OV-2 Operational node interactions and needlines based on joint planning doctrine

6. OV-3: Operational Information Exchange Matrix

Table 3 - OV-3 Matrix

Needline	Information Element	Producer Node	Consumer Node	UJTL Task	Transaction Type	Timing	QoS Rqmt	Security Classif. (highest)	Distribution Handling
AADC::JFACC Communications	AADC Recommend-ations	AADC	JFACC Communica-tions	Air Operations Planning	Point to Point	periodic 24 hr	best effort (receipt)	U	US only
JFACC Communications:: AADC	Operations Orders	JFACC Communica-tions	AADC	Air Operations Planning	Force Broadcast	periodic 24 hr	best effort	U	Coalition
JFACC Communications:: AADC	JFACC Guidance	JFACC Communica-tions	AADC	Air Operations Planning	Point to Point	when issued	reliable	U	Coalition
JFACC Communications:: JFACC Planning	AADC Information	JFACC Communica-tions	JFACC planning	Air Operations Planning	Point to Point	on event	best effort (receipt)	U	Coalition
JFACC Communications:: JFACC Planning	Force Orders	JFACC Communica-tions	JFACC planning	Air Operations Planning	Force Broadcast	when issued	best effort	U	Coalition
JFACC Planning:: JFACC Communications	Operations Orders	JFACC Planning	JFACC Communica-tions	Air Operations Planning	Force Broadcast	periodic	best effort	U	Coalition
JFACC Planning:: JFACC Communications	JFACC Guidance	JFACC Planning	JFACC Communica-tions	Air Operations Planning	Point to Point	when issued	reliable	U	Coalition

examples from: OMG Document Number: dtc/2007-08-02 <ftp://ftp.omg.org/pub/docs/dtc/07-08-02.pdf>

Assertion: How can we Solve this Problem?

solution assertion:

use more diagrams and representations

that are close to the human experience

and use concrete examples

examples:

time

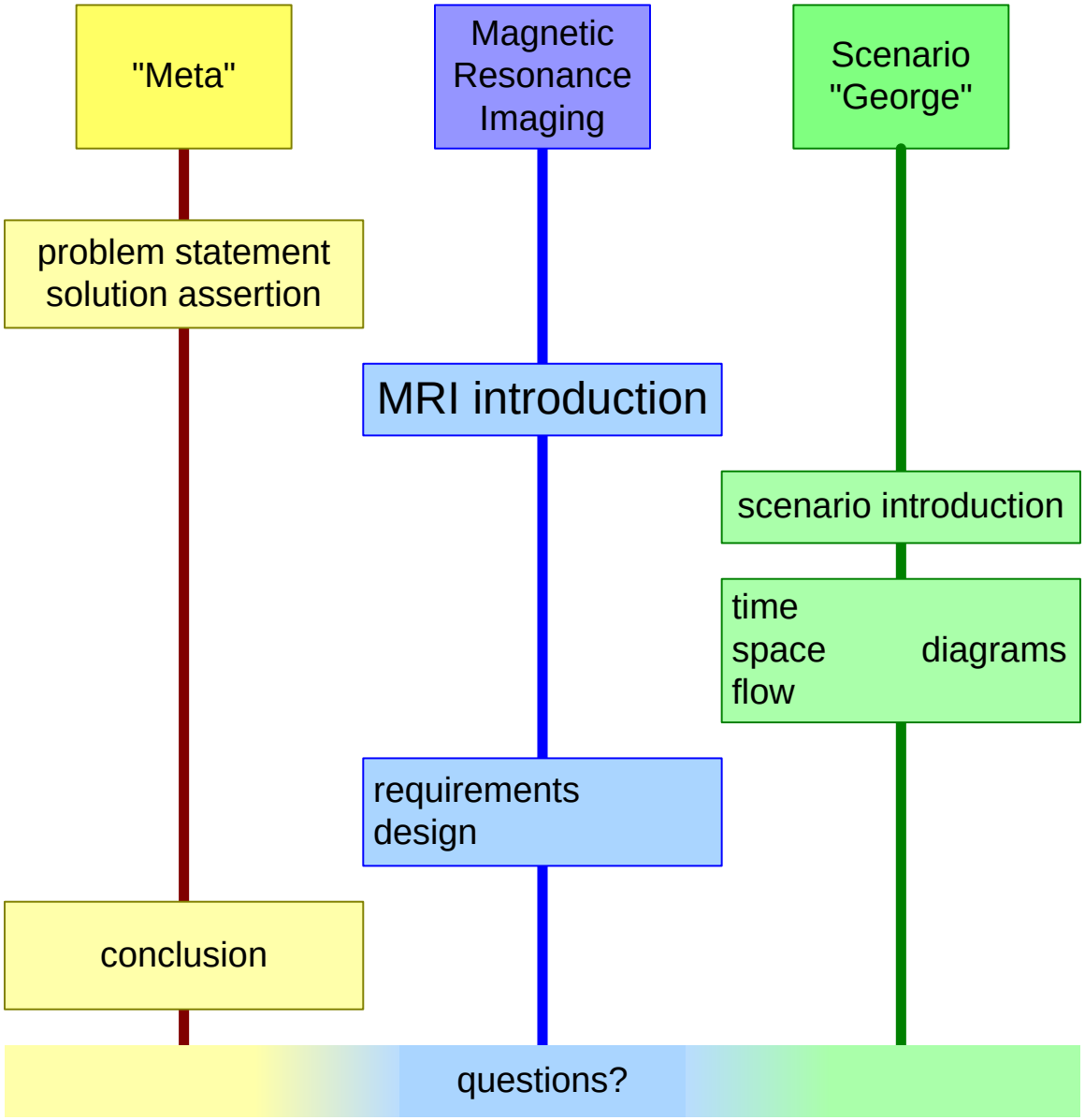
space (e.g. maps)

flow

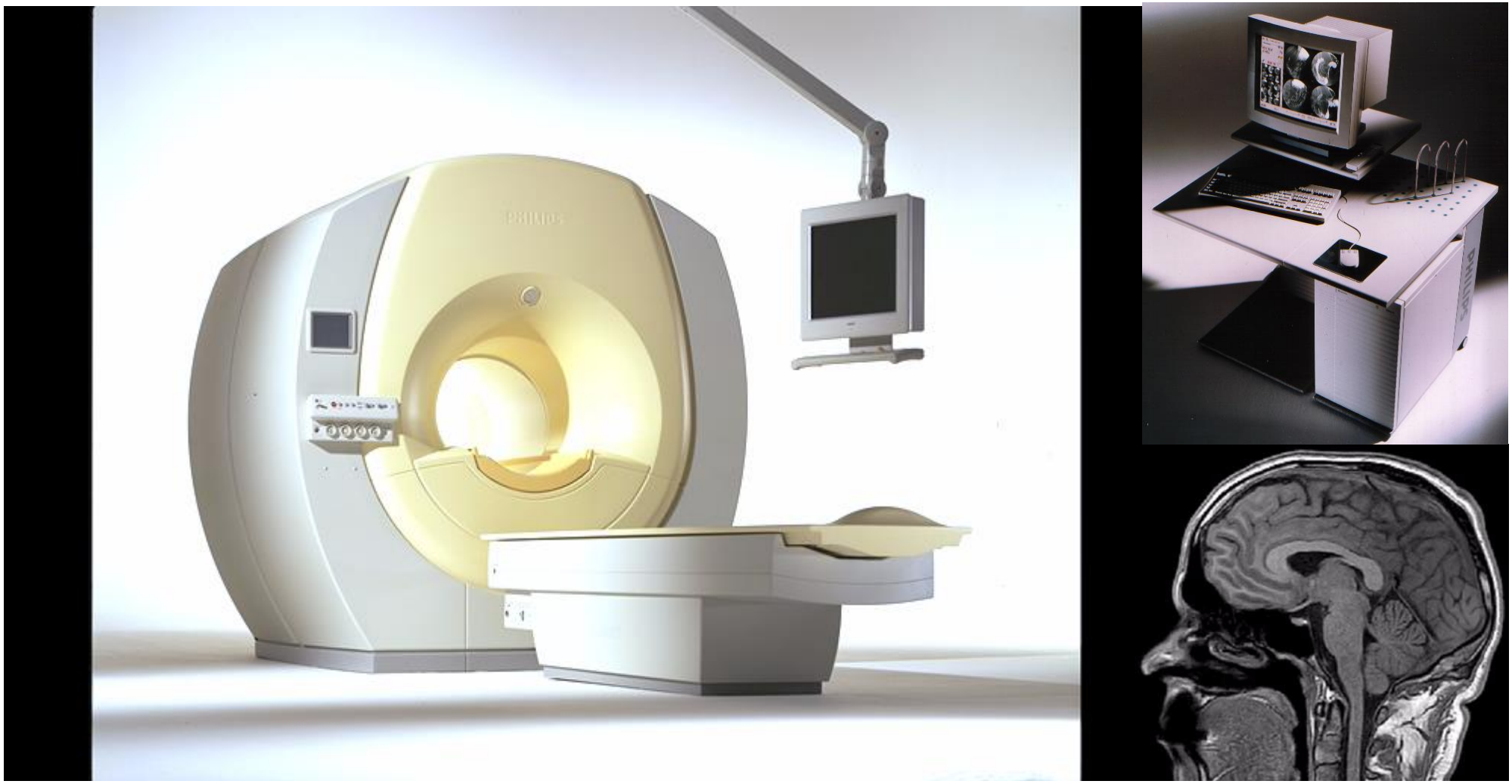
scenario's, stories

diagrams

Magnetic Resonance Imaging Introduction



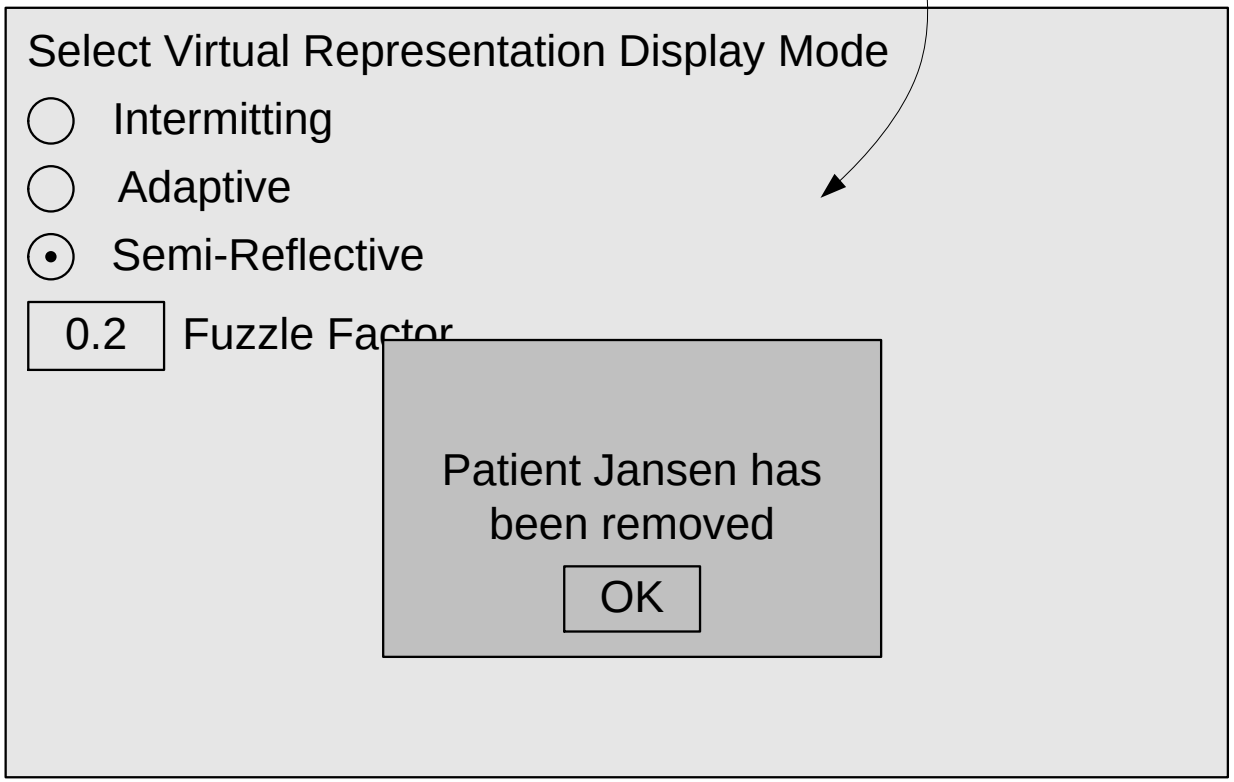
Case: Magnetic Resonance Imaging (MRI)



Example of Engineering Induced Problem

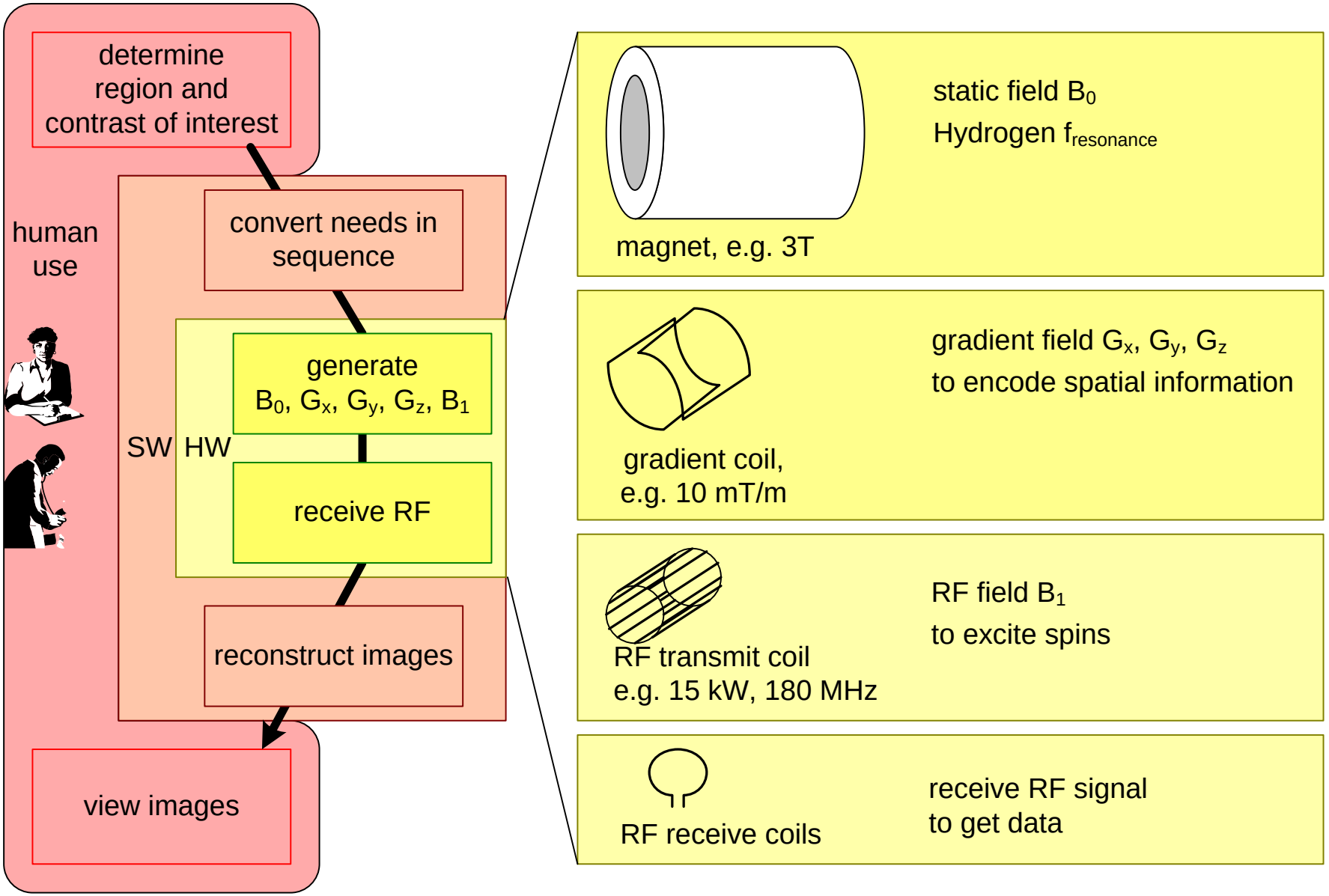
The engineer creates a technological UI...

without imagining the clinical reality

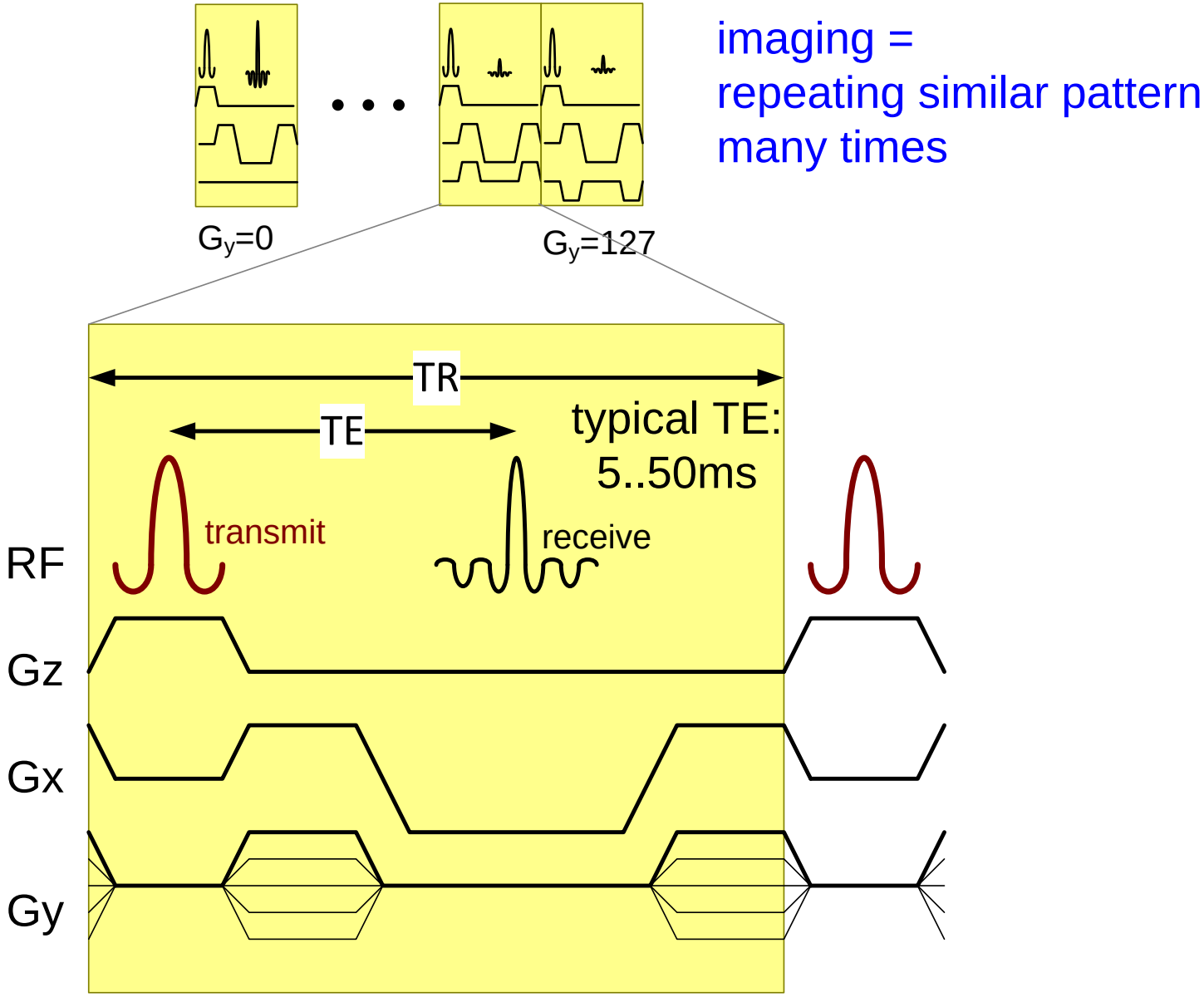


"In the meantime the patient is horrified by the intimidating system, the weird cage around his body and the EKG leads attached to his breast..."

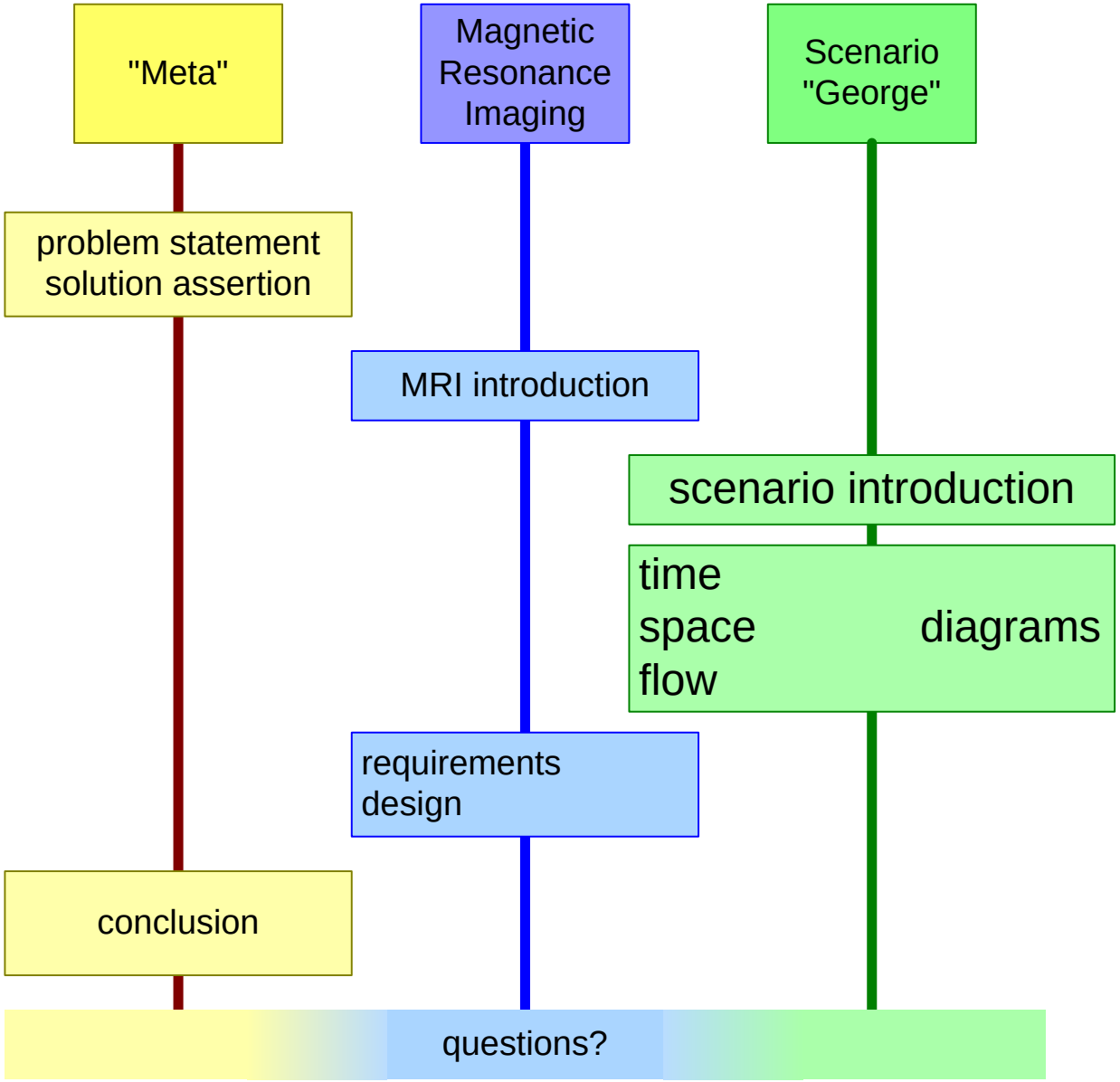
MRI Basic Principles



Basic Imaging Sequence



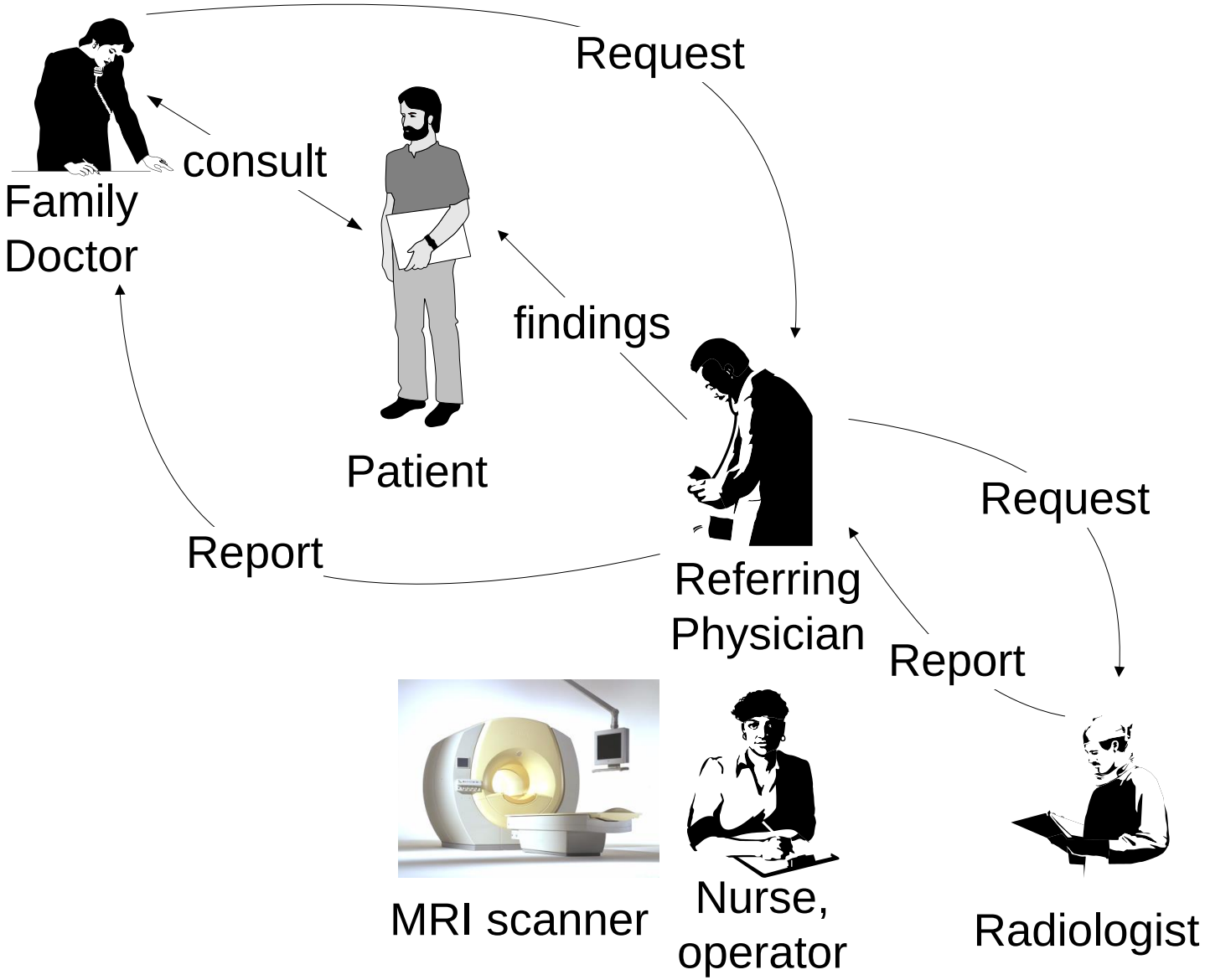
Scenario


"Meta"
Magnetic Resonance Imaging
Scenario "George"
problem statement
solution assertion
MRI introduction
scenario introduction
time
space
flow
diagrams
requirements
design
conclusion
questions?

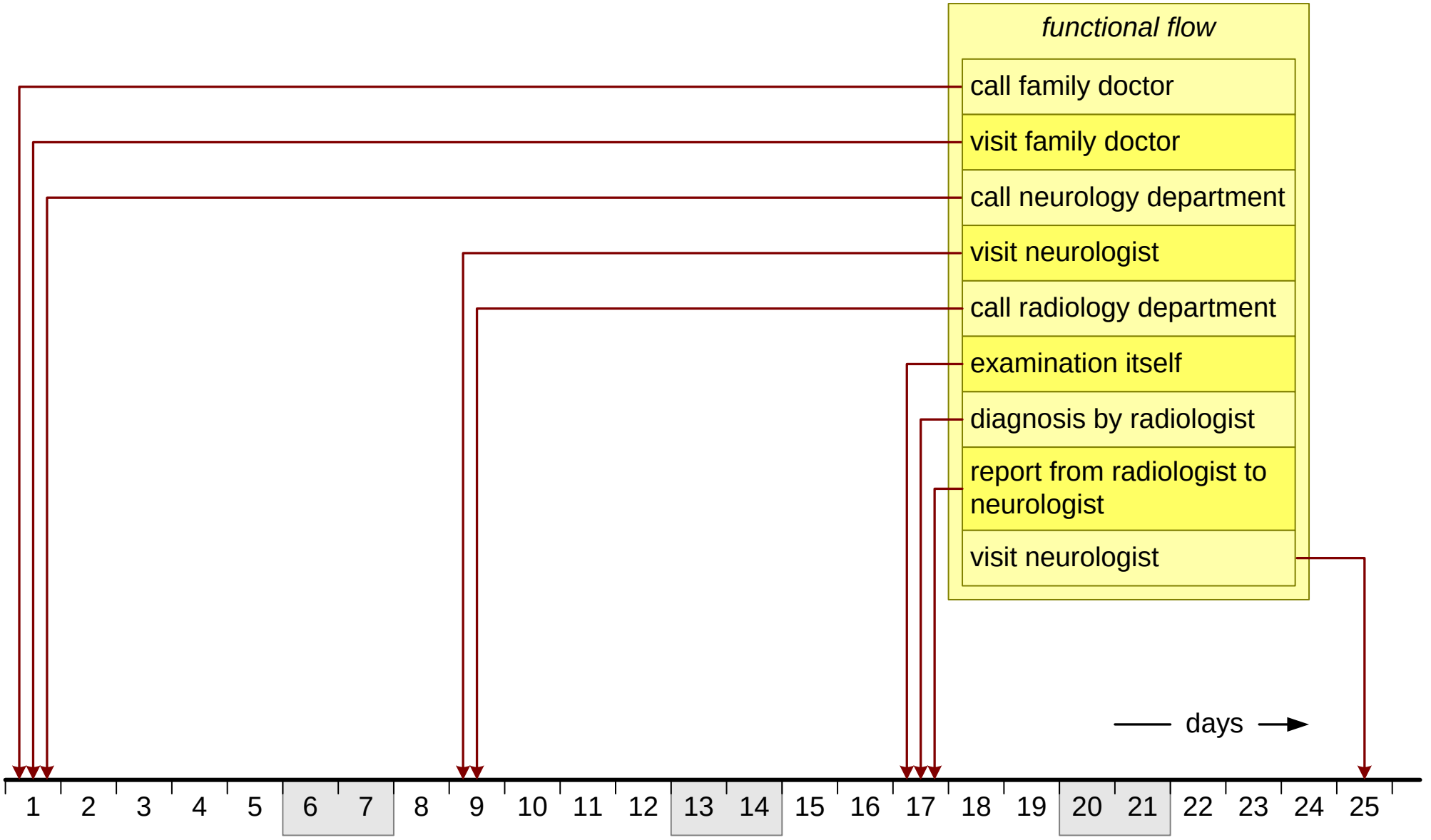
Scenario: Patient George

- Patient George has continuous headache.
- His family doctor has send him to the Neurologist.
- The Neurologist wants to exclude the possibility of a tumor and requests an MRI examination.
- The Radiologists does not see any indication for a tumor.
- The Radiologist sends his report to the Neurologist.
- The Neurologist discusses his findings with the patient and sends a report to the family doctor.

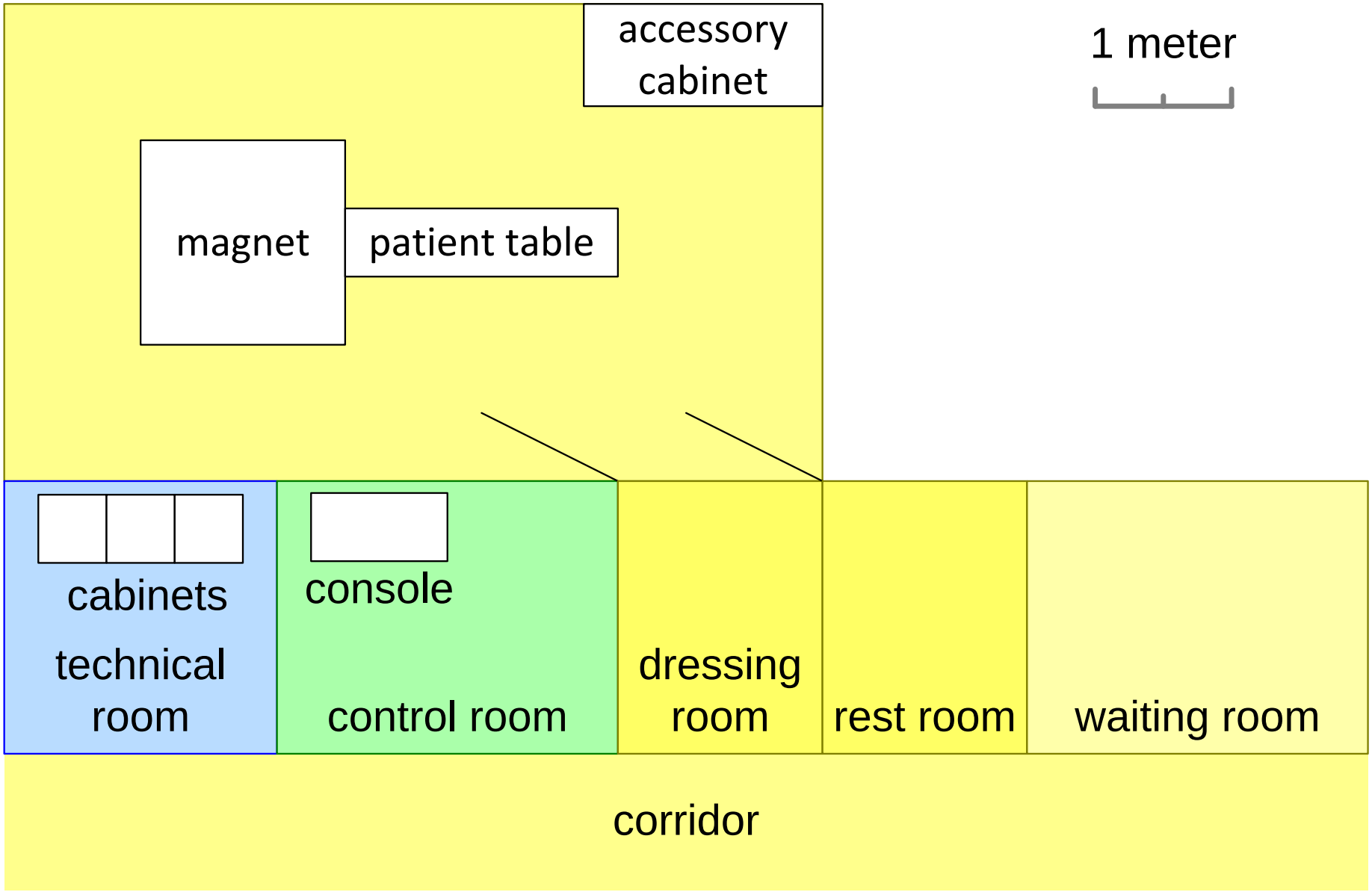
From Complaint to Diagnosis



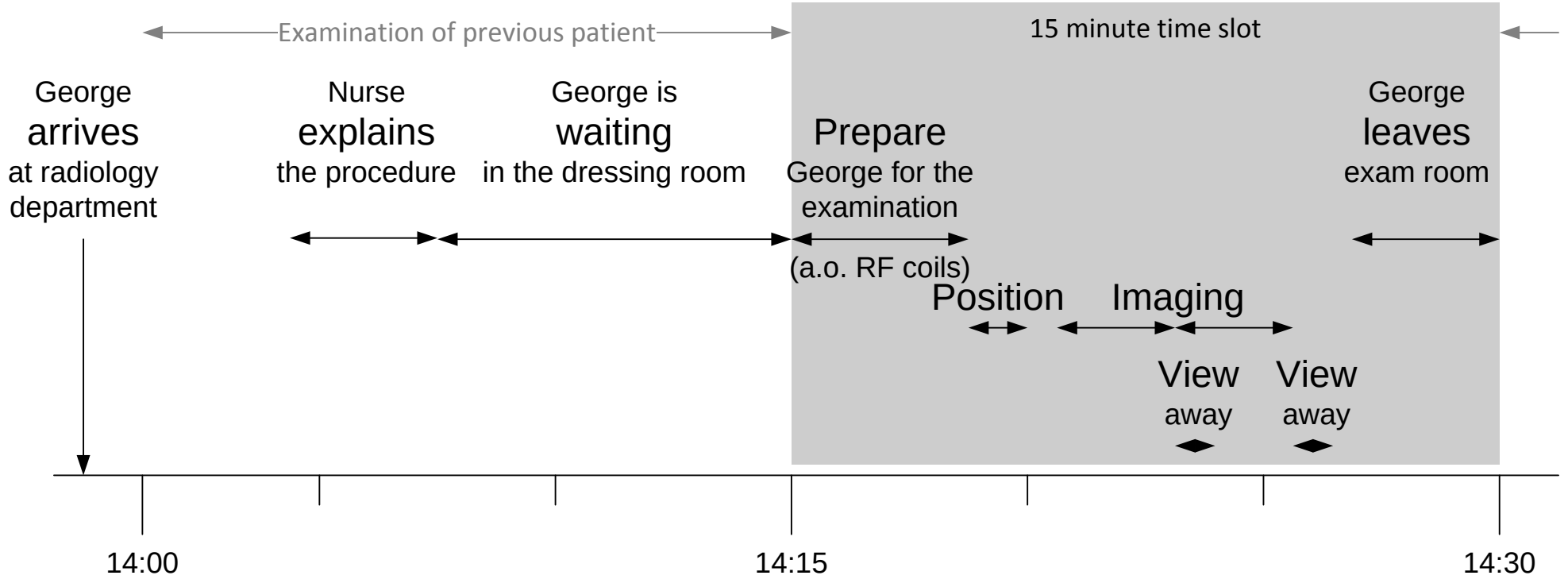
weeks view: from Complaint to Diagnosis



Room Layout


accessory cabinet
1 meter
magnet
patient table
cabinets
technical room
console
control room
dressing room
rest room
waiting room
corridor

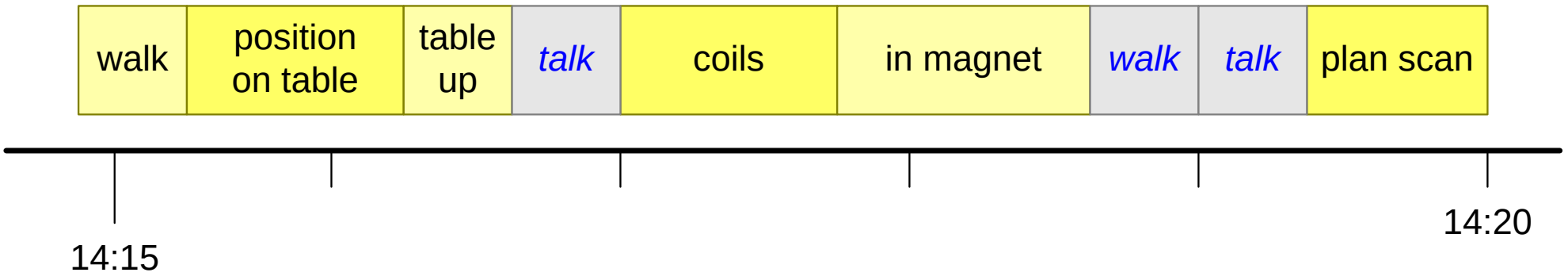
half hour view: Examination



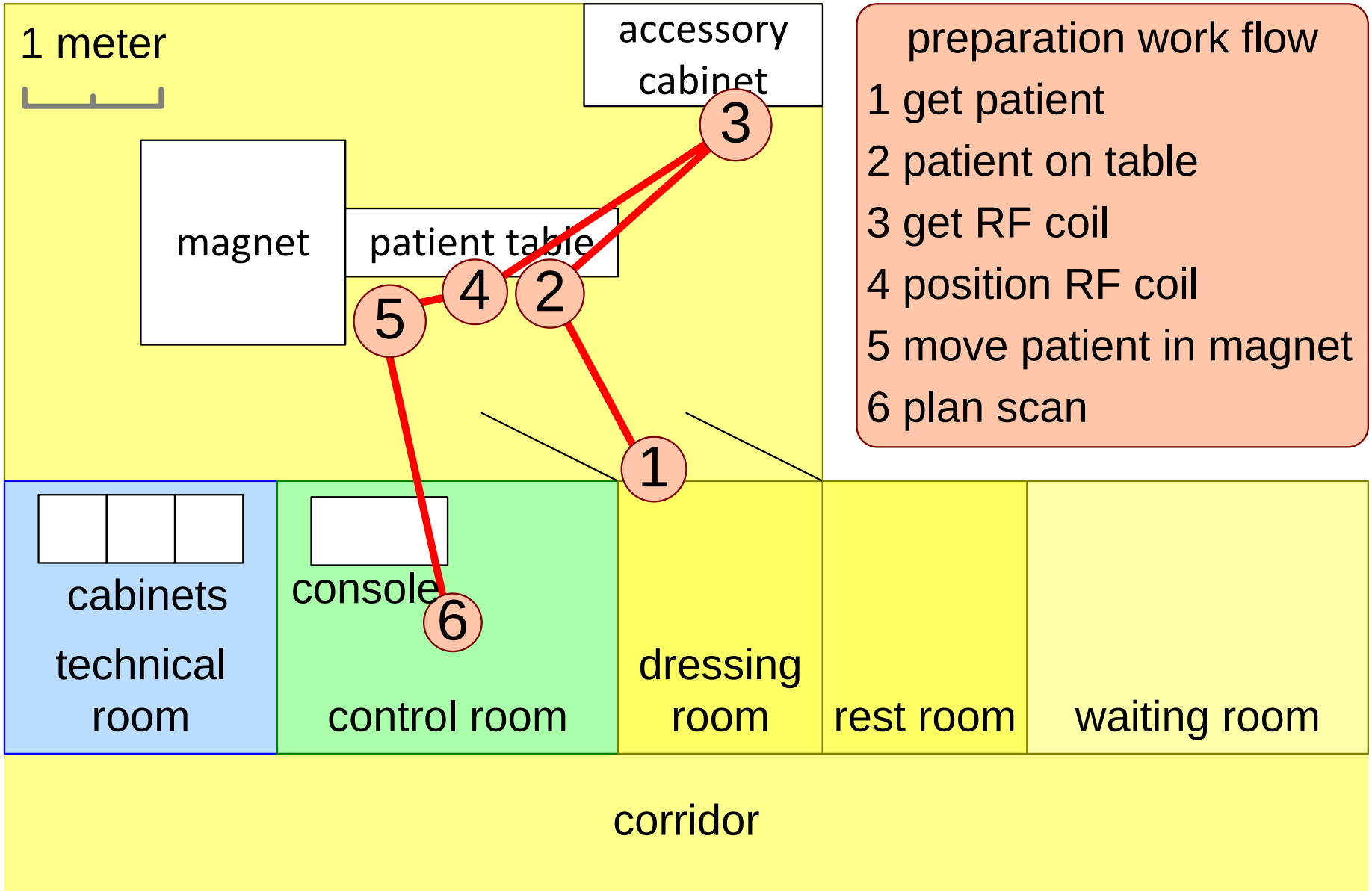
5 minute view: Patient Preparation (1 operator)

functional procedure

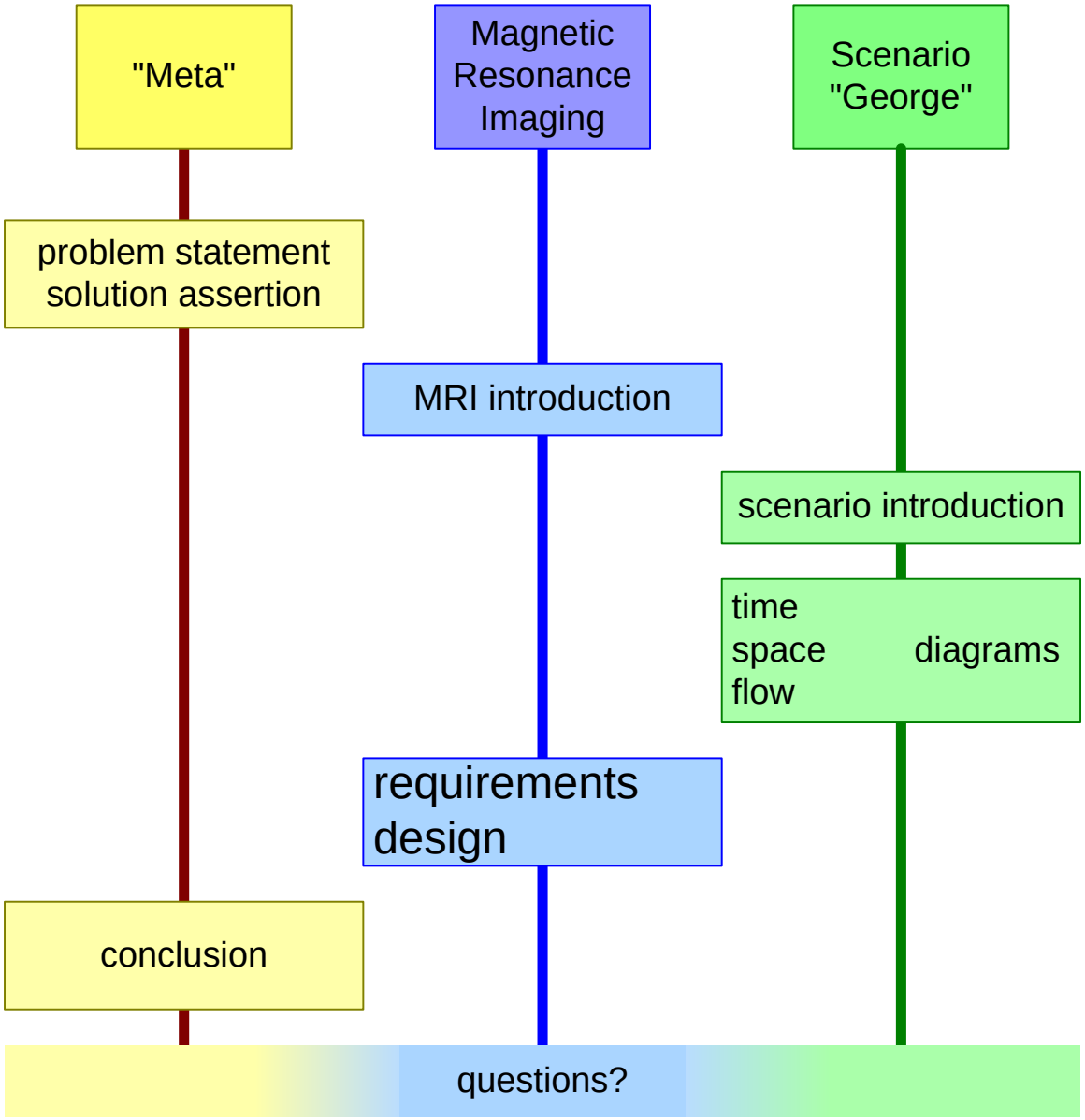
- walk from dressing room to table
- position patient on table
- move table upwards
- position coils and connect
- move table and patient into magnet
- make plan scan



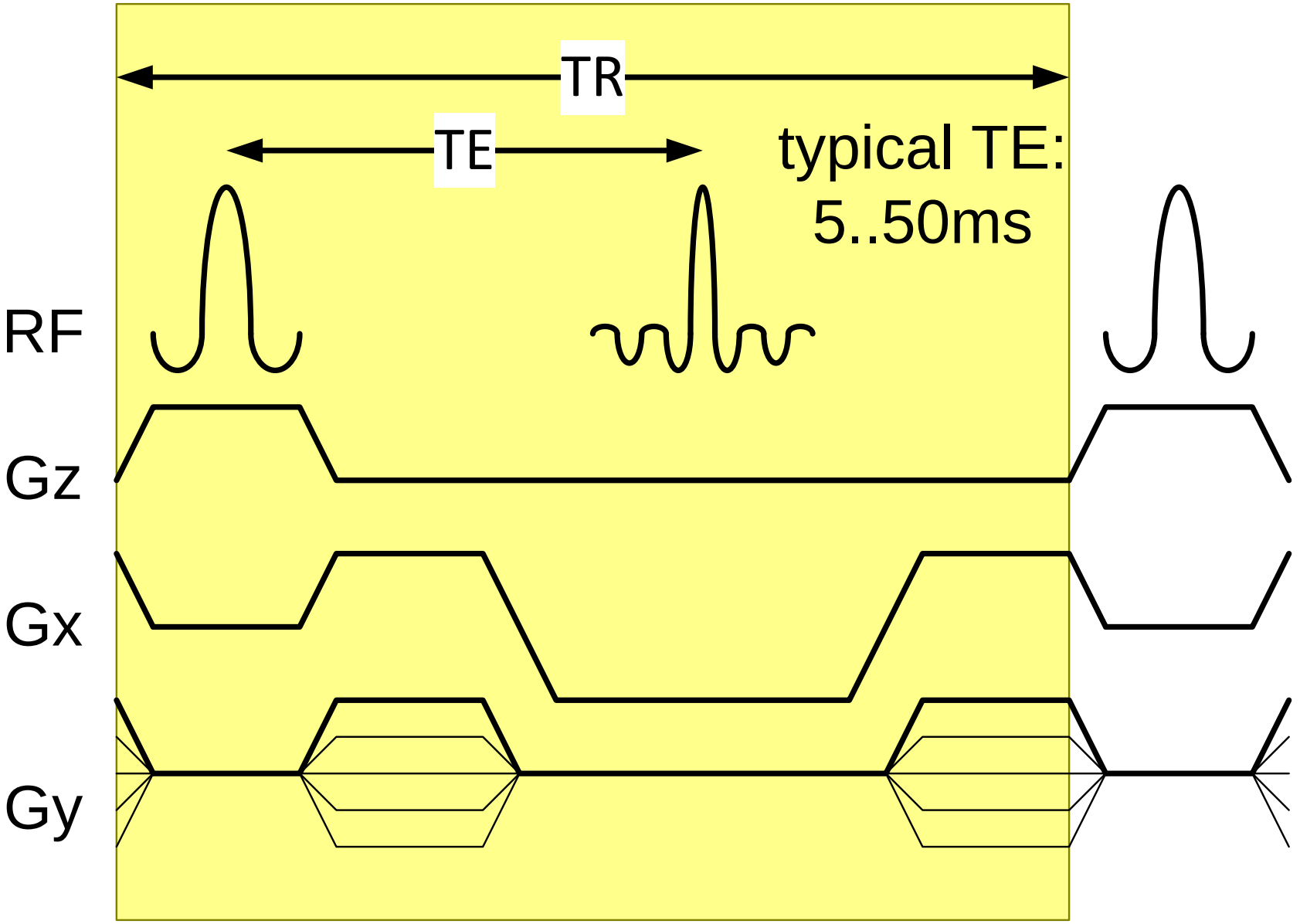
Patient Preparation Work Flow



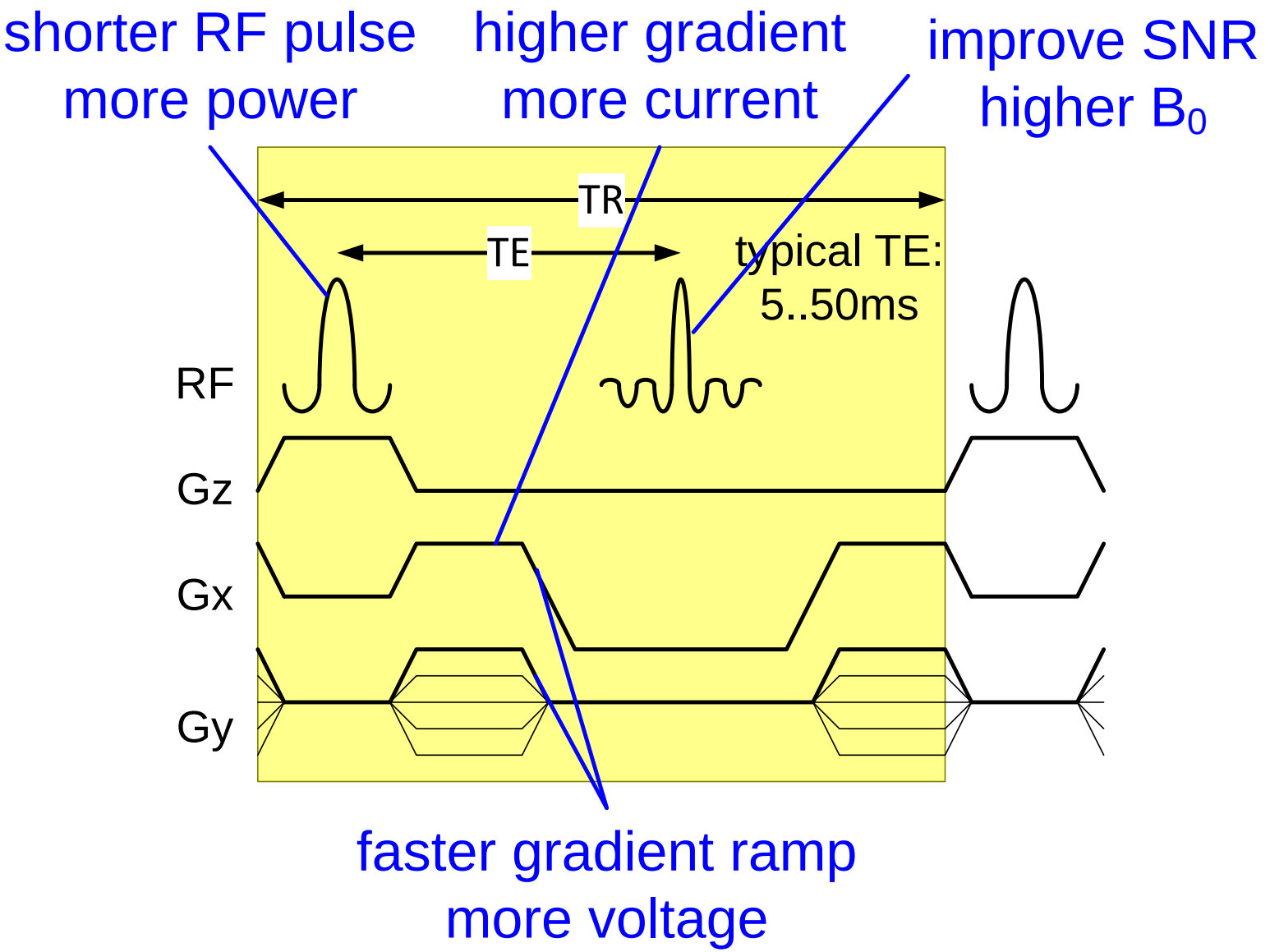
MRI Requirements and Design



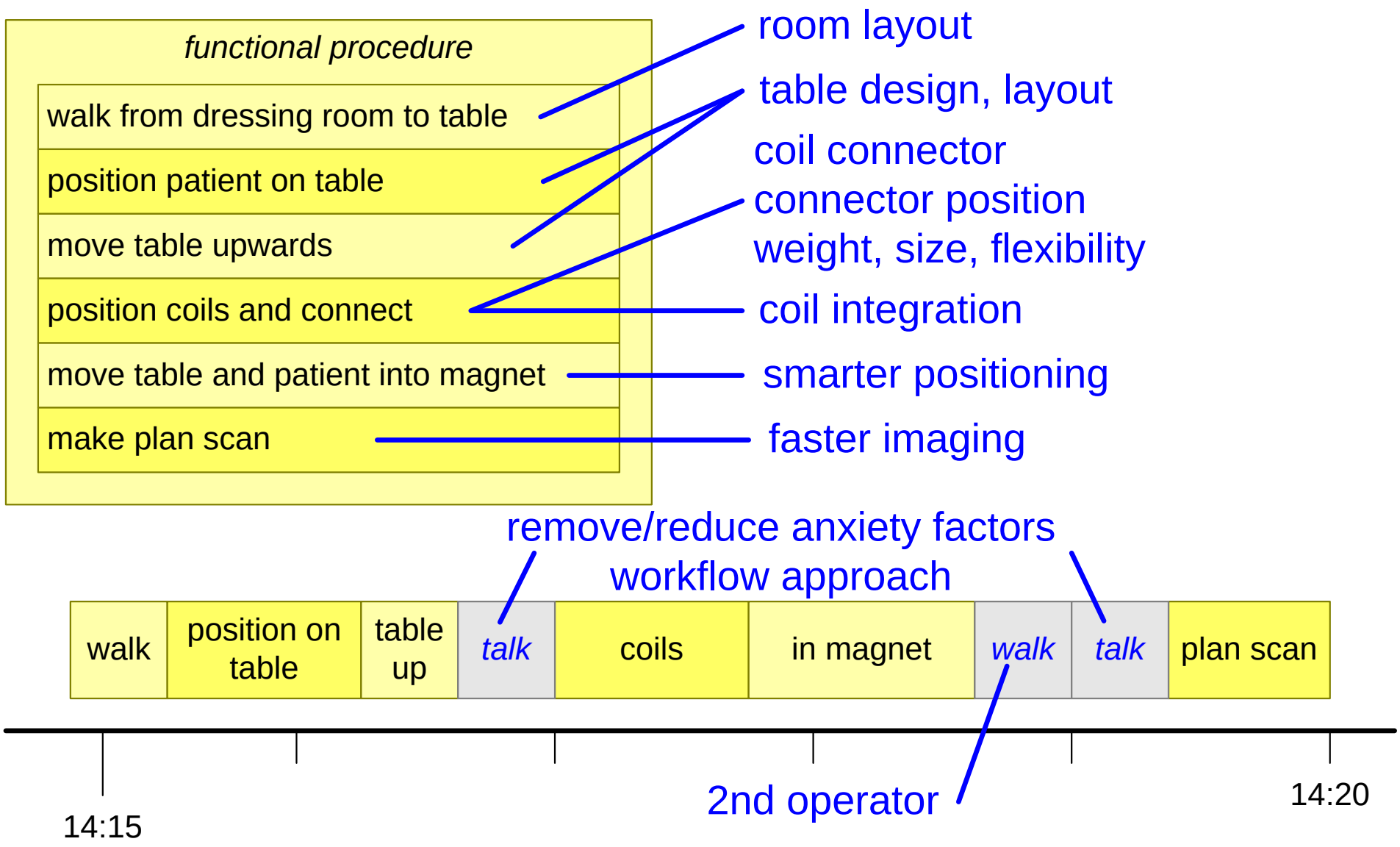
10..100ms view



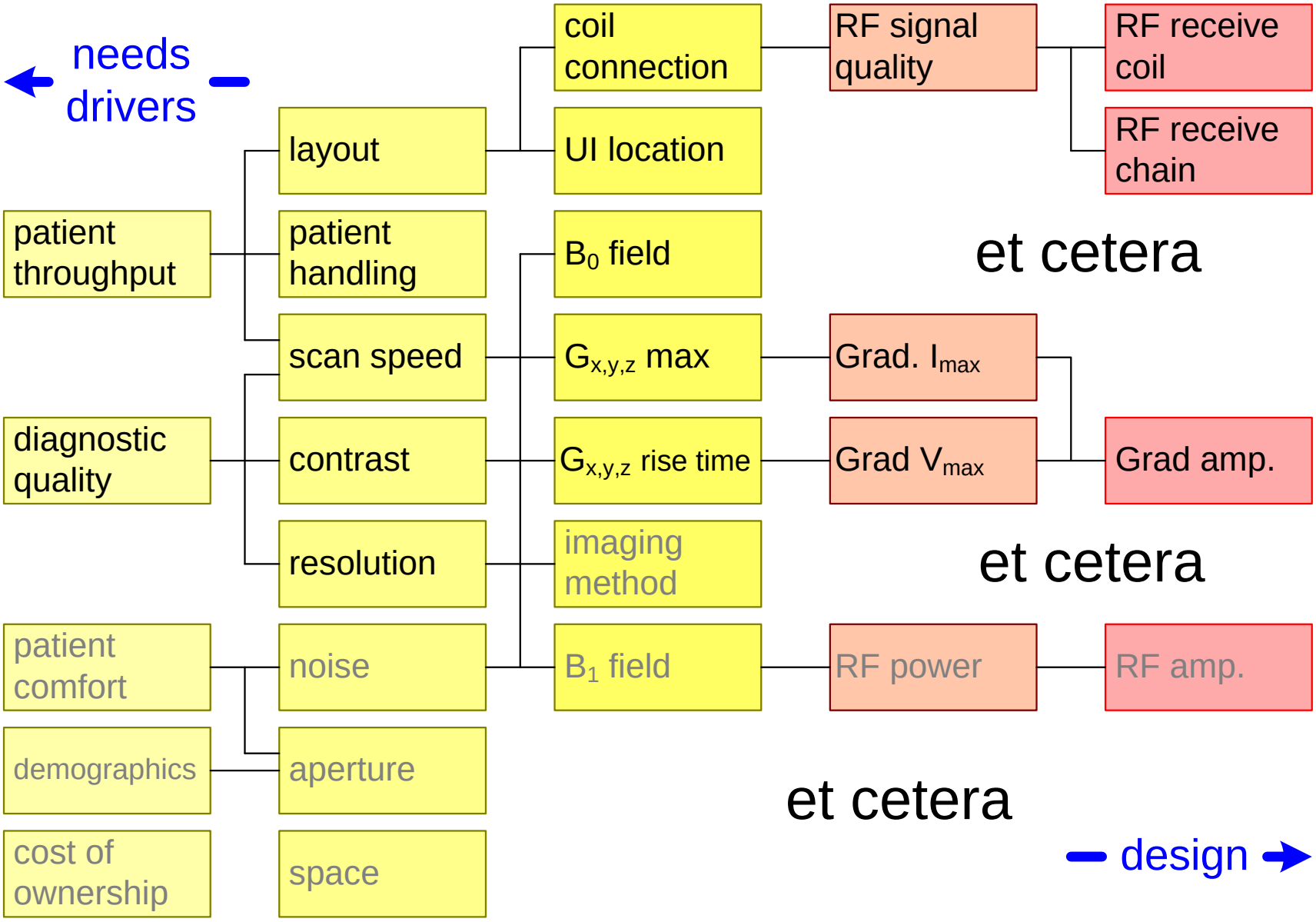
How to Increase Imaging Performance?



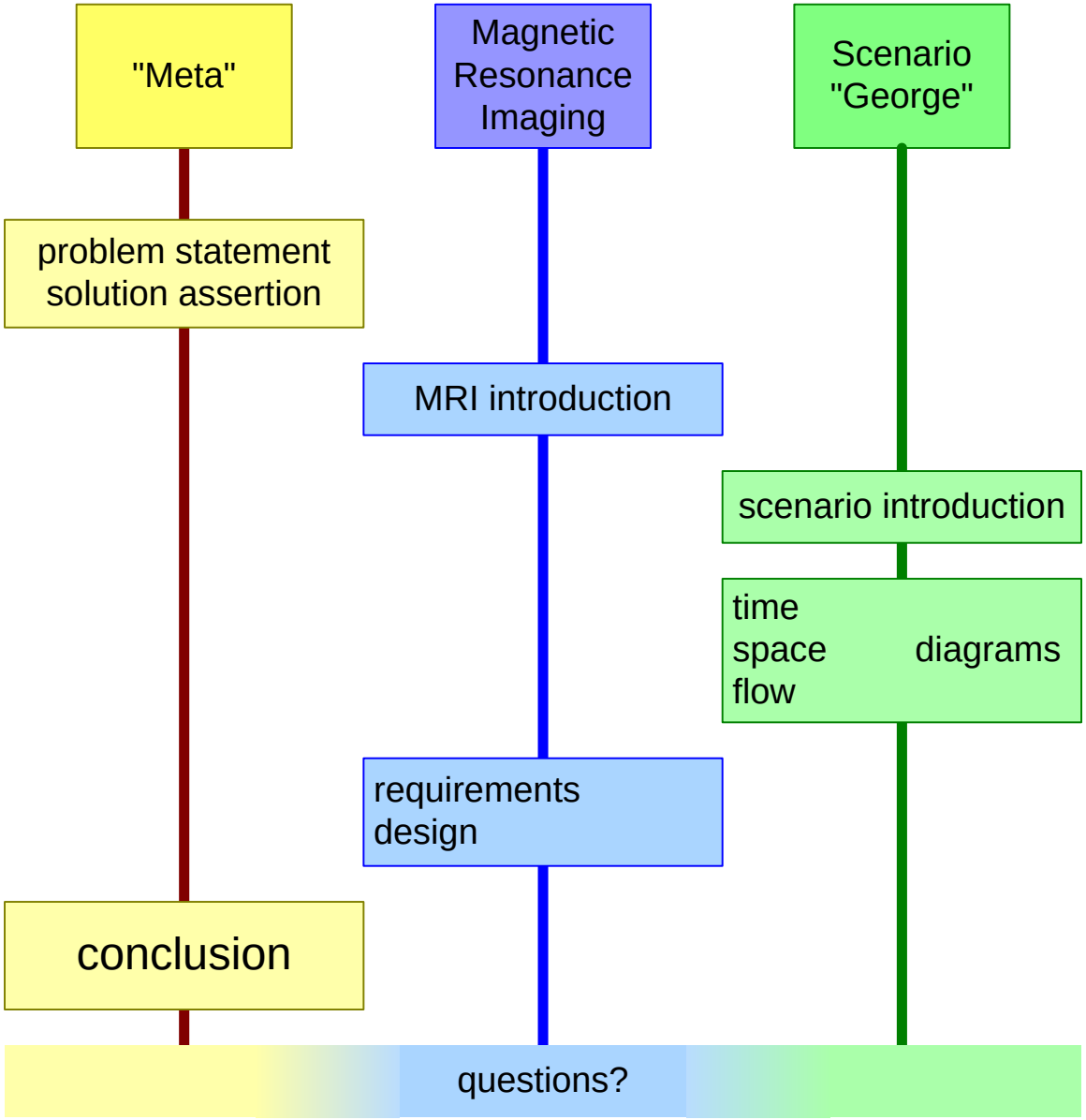
How to Speed-up Patient Preparation?



Relations Needs, Requirements, Design Choices



Conclusion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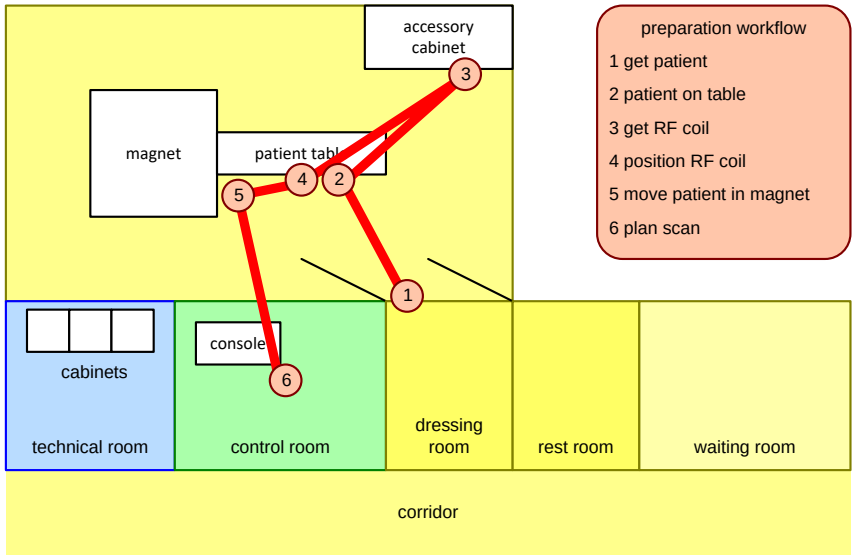
Diagrams Conclusion



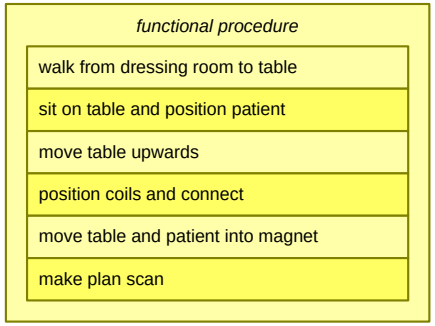
2D map

time, *space* and *flow* diagrams are:

complementary

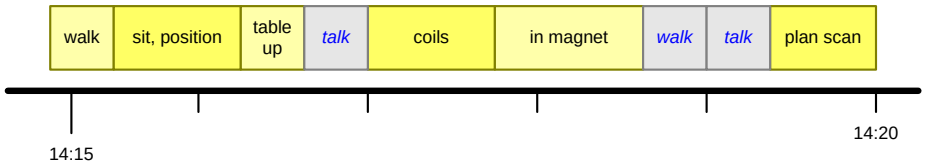
close to human experience

insightful

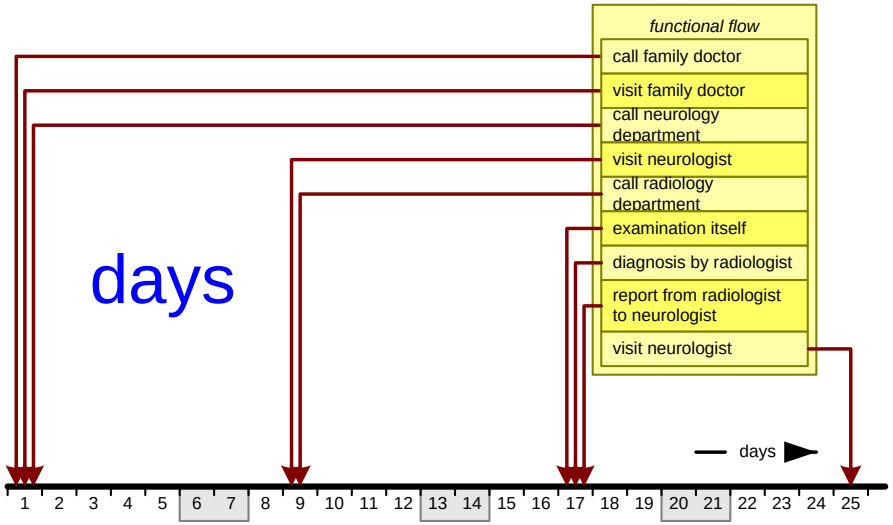


work flow

time line



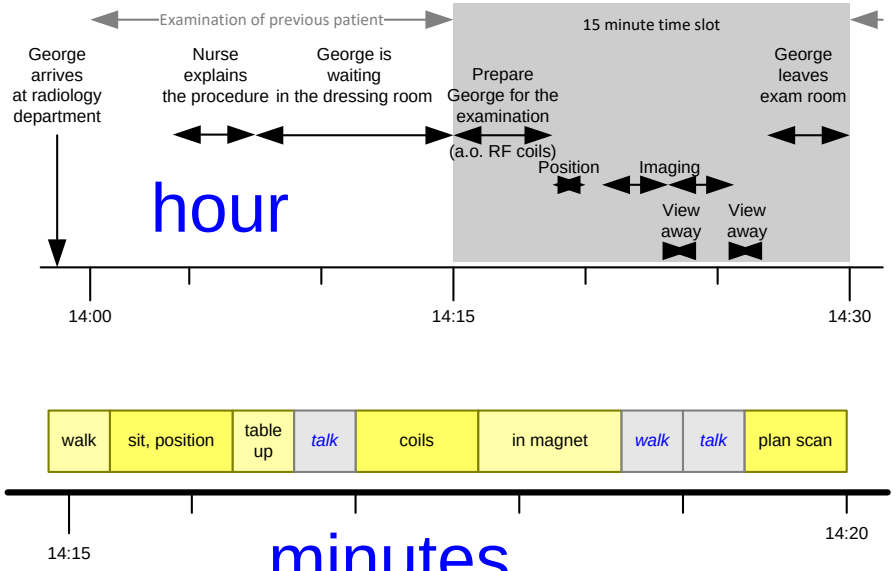
Scale Conclusion

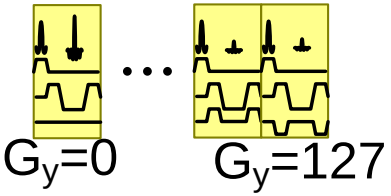


time, *space*, and *flow* diagrams are useful in a broad dynamic range.

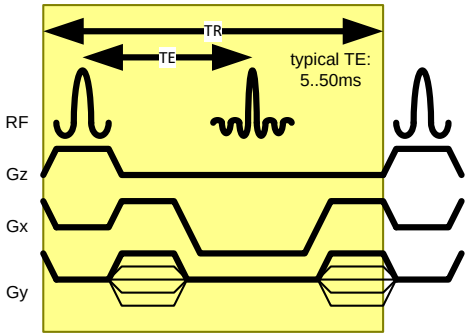
nano..giga seconds

nano..giga meters





sec..min



10..100 ms

Scenario/Story Conclusion

- Patient George has continuous headache.
- His family doctor has send him to the Neurologist.
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- The Radiologists does not see any indication for a tumor.
- The Radiologist sends his report to the Neurologist.
- The Neurologist discusses his findings with the patient and sends a report to the family doctor.

Stories and *Scenarios*

make discussions concrete

are *means* to understand

are *means* to design