

Living Lab for Digital Health Evaluation

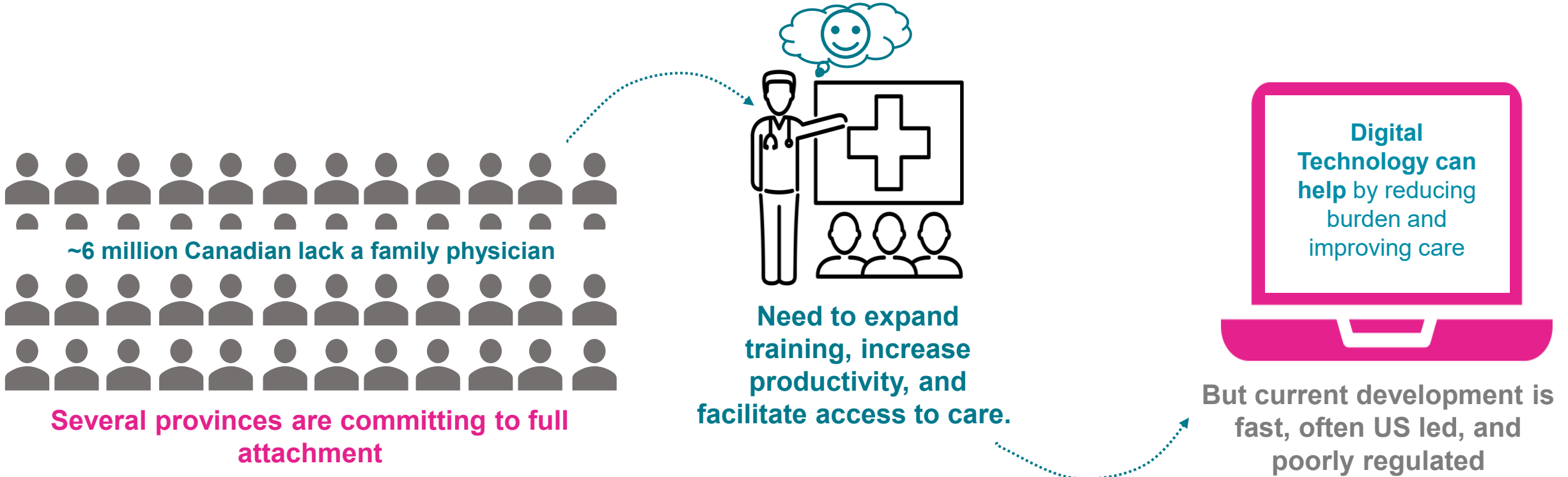
For the Patient Partners

March 4, 2026

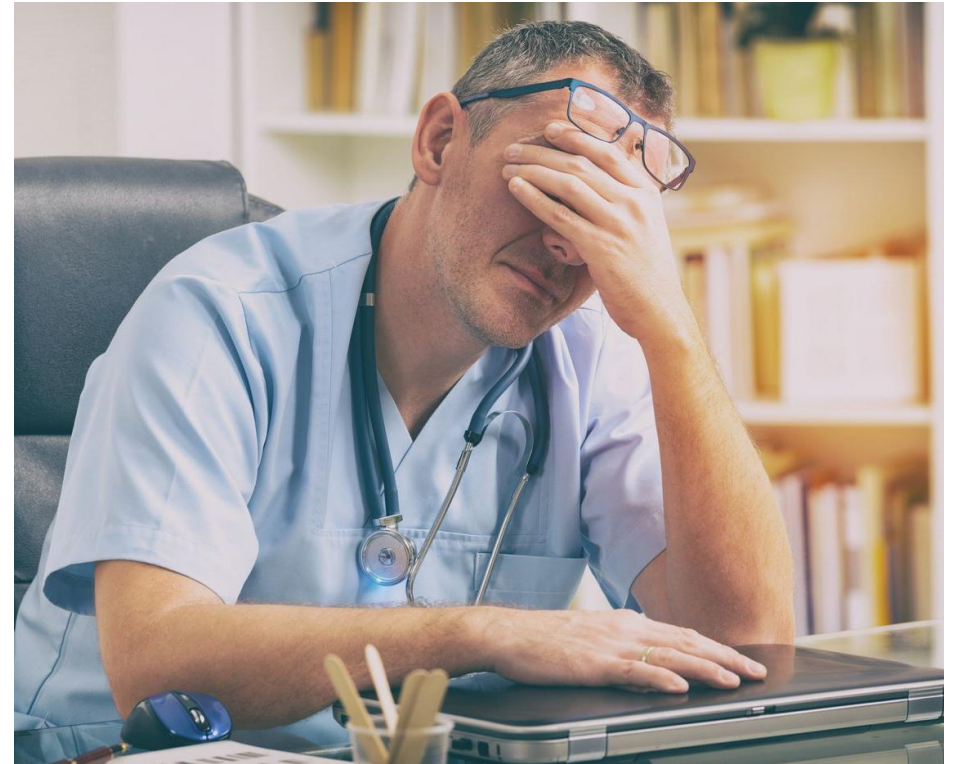
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Frigon Blau Chair in Family Medicine Research
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University of Toronto



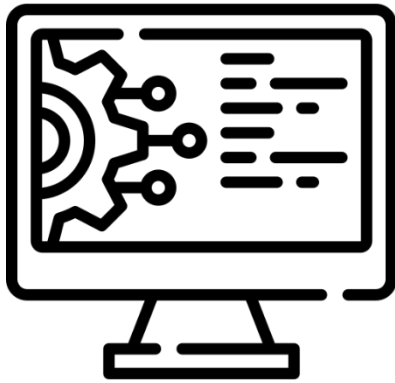
The Problem in Primary Care



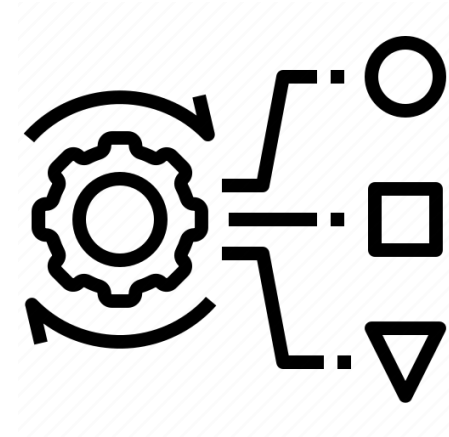
The IT Productivity Paradox



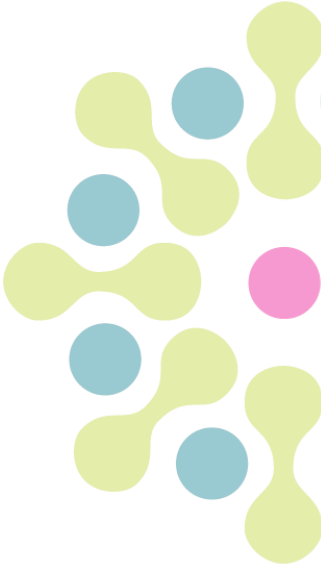
IT Productivity Paradox



**Build better
tools**



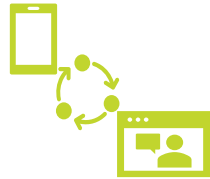
**Reimagine
the work**



The Challenge of Digital Transformation



Rapidly evolving technologies with **uncertain value**



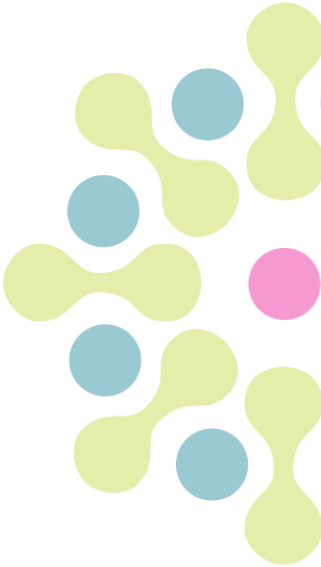
Many interdependent tools emerging without a clear understanding of the digital ecosystem and how they work together

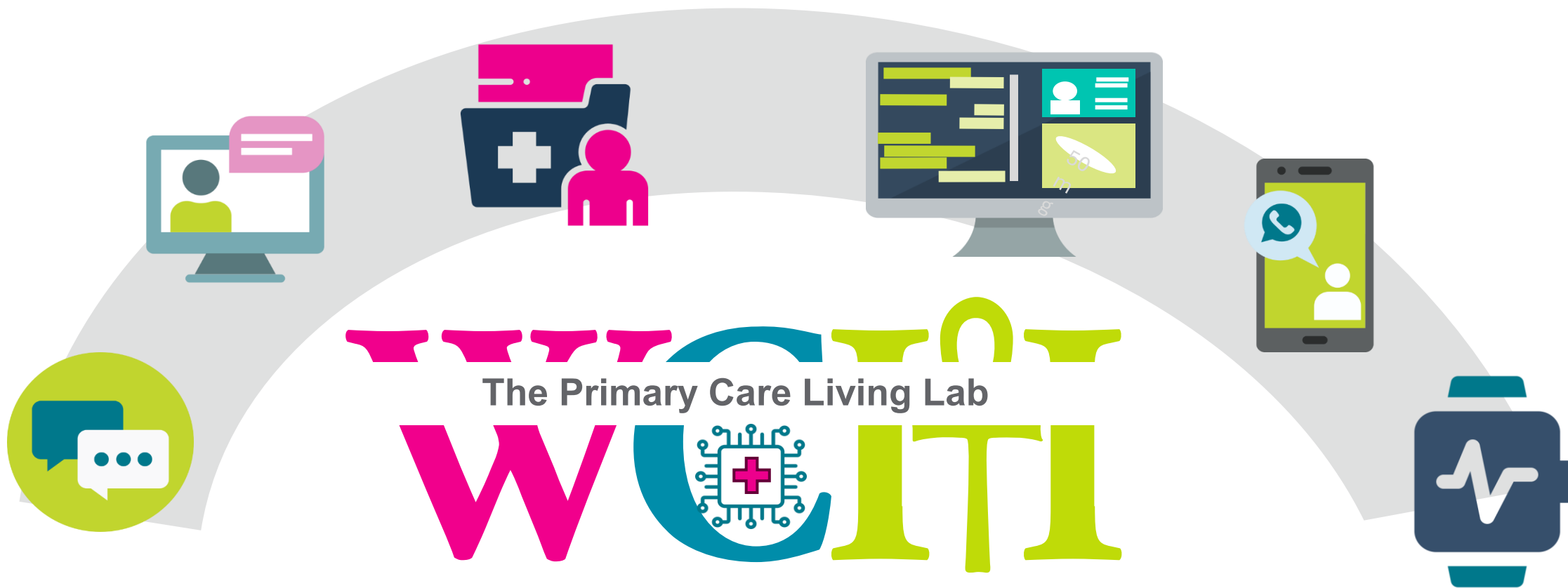


Short windows to make procurement and implementation decisions



Changing roles of doctors, other health professionals, administrative staff and patients





Our Team



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Director of the Institute for Health Systems Solutions and Virtual Care (WIHV) + CDHE
Co-chair of the Canadian Primary Care Research Network (20 practice-based networks in 8 provinces)



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Unity Health Toronto



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Design Anthropologist



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Design and Foresight
Expert



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CDHE Track Record

Responsiveness



Rapid, high-quality execution



18 digital health evaluations in 3 years



Evidence that informs real-world policy and decisions



Large, skilled team for fast, scalable work

Ownership



Living Lab model drives shared responsibility

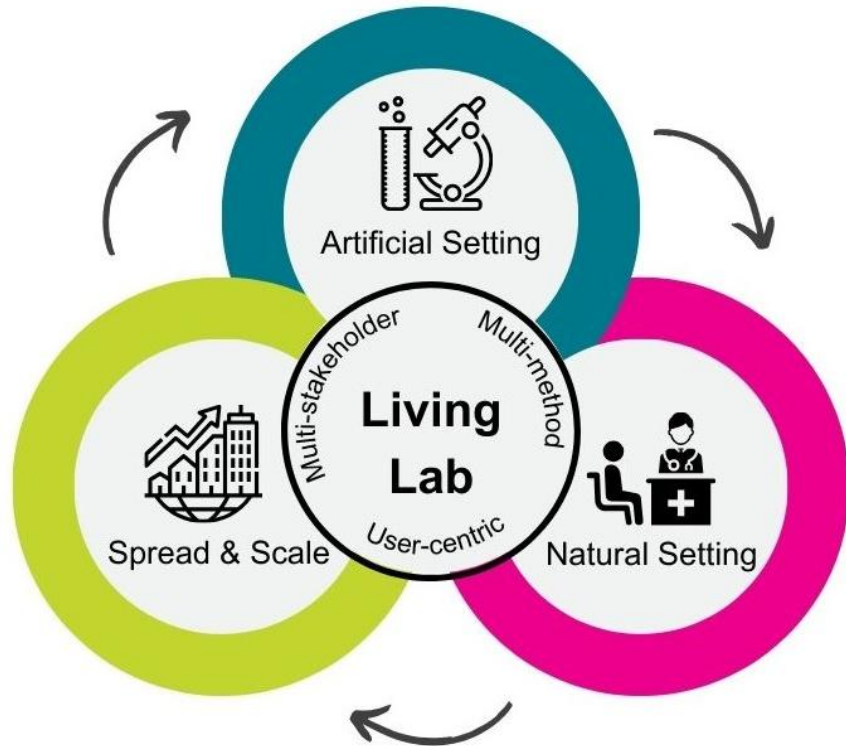


Solutions shaped by end-user priorities



Grounded in real-life workflows and needs

What can a Living Lab do?



1. Discover value propositions

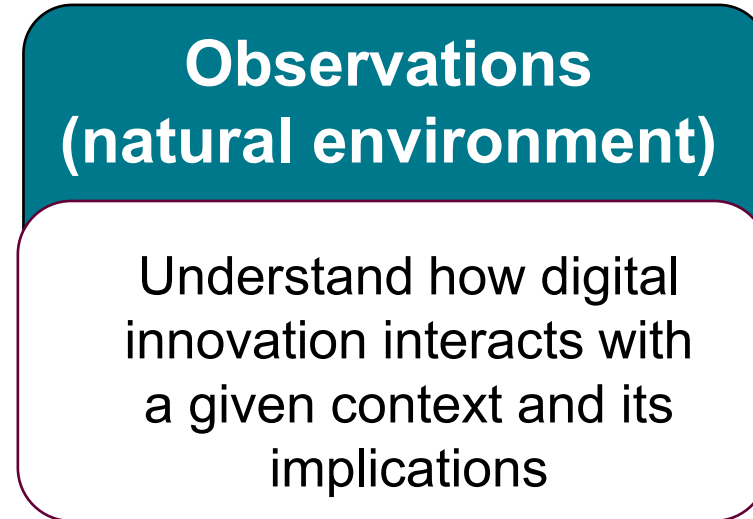
2. Validate prototypes

3. Assess impact and scalability

4. Build digital ecosystems

Adapted from: Schuurman D, De Marez L, Ballon P. Open innovation processes in living lab innovation systems: Insights from the LeYLab. Technology Innovation Management Review. 2013;3(11).

The WCH Living Lab Building Blocks

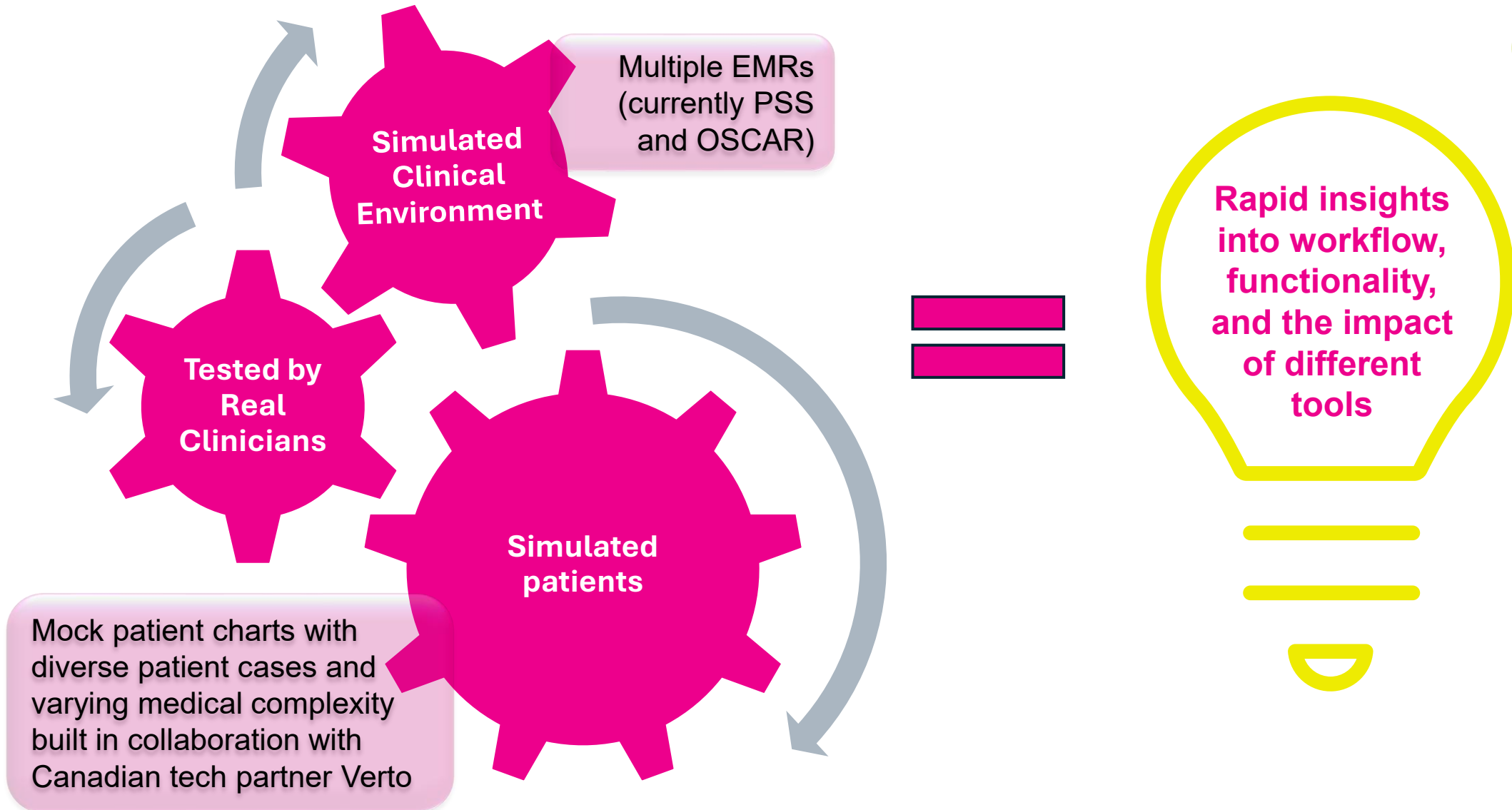


Governance Structure

- Independent governance committee
 - 2 external scientists (1 with engineering background)
 - 2 clinicians
 - 2 patient partners
- Role similar to steering committee
- Ensure activities conducted with the Living Lab (“Platform Study”) are aligned with ethical standards, regulations and community engagement principles



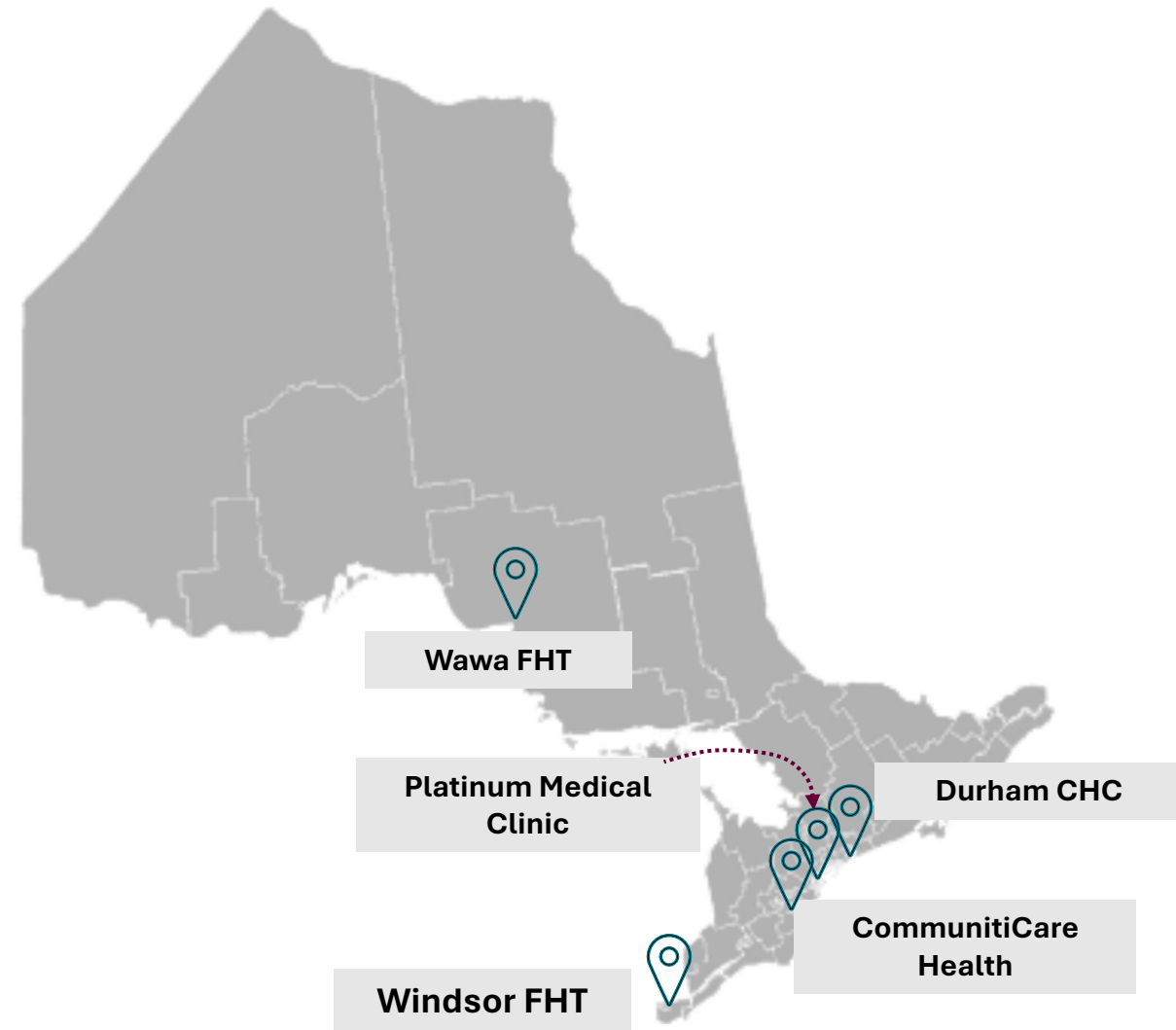
WCH Living Lab Building Blocks: **Simulations**



WCH Living Lab Building Blocks: **Observations & Partnership**

Network of Sentinel Sites

We are recruiting **5 - 7 sites** from **across Ontario** representing different practice types and populations.

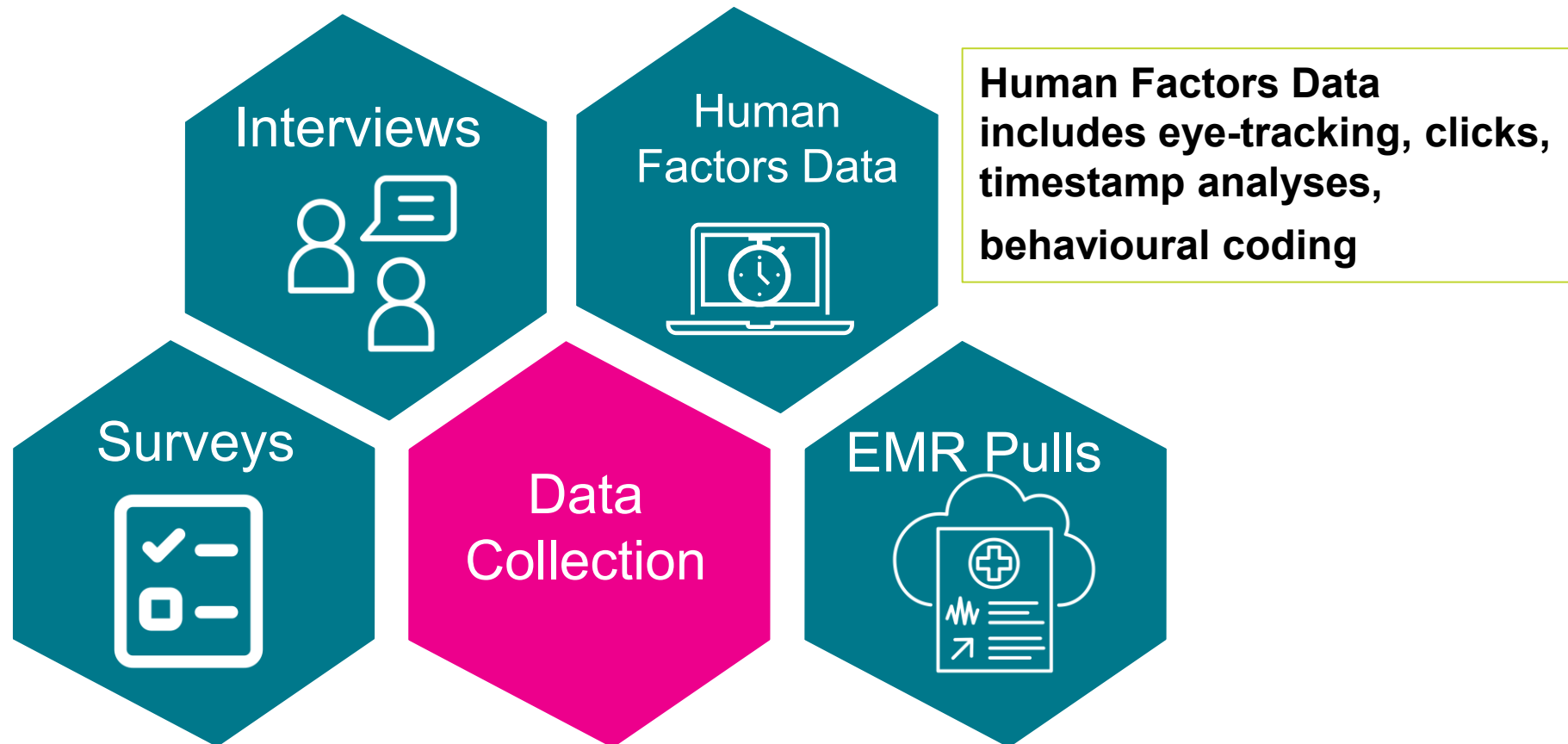


Partners and Stakeholders



Evaluation Methods within WCH Living Lab

The choice of method often depends on the goal of the evaluation, resource availability, and whether the tool is already in use or still in development.

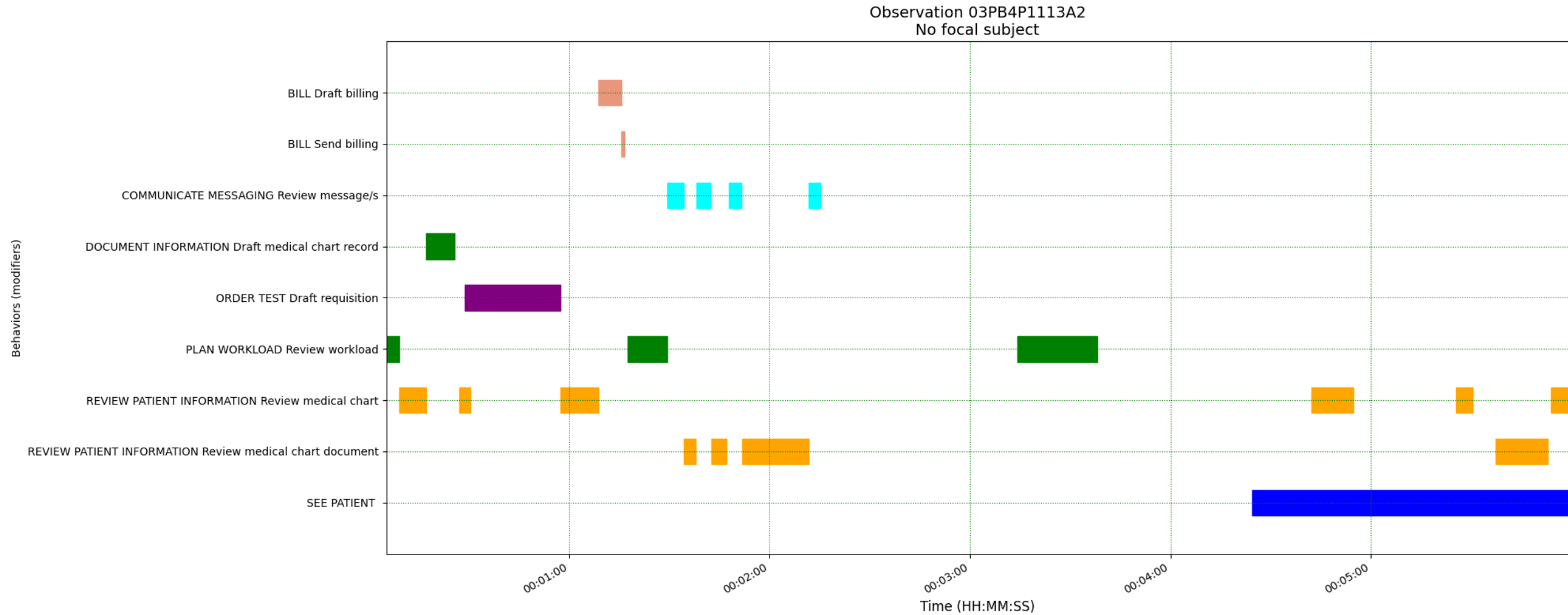
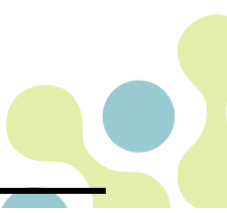


Living Lab Methods: Behavioural Coding



Behavioural Coding Lab, Usability Lab, and Live Coding Team at work

Living Lab Methods: Behavioural Coding



Administrative burden events recorded as happening prior to a patient visit

Living Lab Methods: Workflow Analysis

	P2				P3		
	Referrals	Prescriptions	Total		Referrals	Prescriptions	Total
In-Clinic Time (% of time)	320s (1.1%)	503s (1.7%)	497 min (100 %)		404s (1.5%)	1054s (4%)	441 min (100 %)
Count Started	3	20			7	14	
Count Completed	1	19			6	14	
Completion Rate	33%	95%			86%	100%	

0. Write a prescription

1. Evaluate patient prescription suitability

Plan: Do 1.1-1.3 in any order as needed, as many times as needed, then proceed to 2, 4, 5, or 6.

- 1.1. Review patient info
- 1.2. Discuss prescription with patient
- 1.3. Judge patient suitability for prescription

2. Draft prescription

Plan: Do 2.1-2.2 in any order, as many times as needed, then if suitable do 2.3, then proceed to 1, 3, 4, 5, or 6.

- 2.1. Reference patient info
- 2.2. Specify prescription values
- 2.3. Sign prescription

3. Submit prescription

Plan: Do 3.1 or 3.2 or both and stop or proceed to 5.

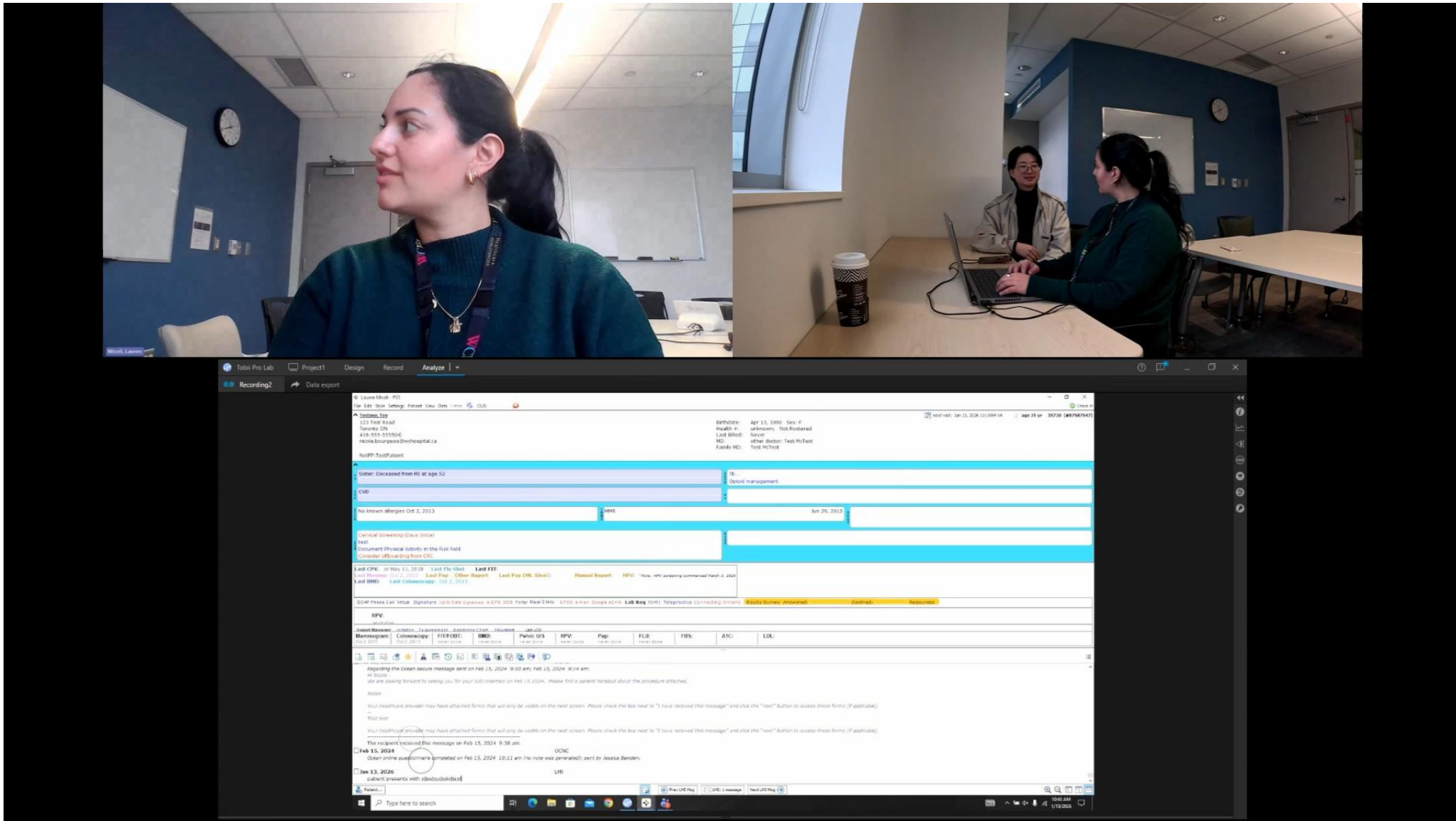
- 3.1. Fax prescription
- 3.2. Print prescription

4. Remove prescription

5. Abandon prescription

Time budget findings and workflow breakdown of administrative burden

Living Lab Methods: Eye tracking



Living Lab Methods: Eye tracking

Lauren Miceli - PSS
File Edit Style Settings Patient View Data Letter OLIS

Testone, Five
123 Test Road
Toronto ON
416-555-5555(H)

Birthdate: Sep 5, 2006 Sex: F
Health #: unknown; Not Rostered
Last Billed: Never
MD: other doctor: Test McTest
Family MD: Test McTest

next visit: not booked
age 19 yr 35705 (#69754786)

Not FP: TestPatient

Mother: Benign Hypertension
appendectomy
Aspirin-> Malignant Hyperthermia
? Food: Peanuts, Tree Nuts, Soybean

Document Physical Activity in the Risk field
Consider offboarding from CRC

Last CPX: or Feb 9, 2015 Last Flu Shot: Dec 4, 2013
Last Mammo: Last Pap: , Other Report: Last Pap
Last BMD: Last Colonoscopy:

SOAP Phone Call Virtual Signature Up to Date Dynam e-C

HPV:
never done

Mammogram: never done Colonoscopy: never done FIT/FOBT: never done BMD: never done

trouble falling or staying asleep, or sleeping too much

If answer YES to any above, please complete custom
«PHQ-9 for Adolescents»

☐ Jan 15, 2026
Start: propranolol 25 mg 1 time daily, PRN for 30 days
No interactions guaranteed by user.
Renewal: propranolol 25 mg 1 time daily, PRN for 30 days
No interactions guaranteed by user.

☐ Jan 15, 2026
Pt presents with worsening migraine over last 2 days
- sensitivity to light
- no allergies
- denies vision or hearing loss
- pain mostly in temporal region rated at 7/10 pain
- allergy to NSAOD
- denies tachycardia and chest pain
- no neck pain, no coughing, no SOB,
- some aura, tingling

prescribed propranolol for migraine prophylaxis taken daily, return after 30 days

Prescription for Five Testone
Patient: Five Testone age 19 years wt: 15.0 Kg (Feb 12, 2012) on: never recorded eSFR: never recorded ODB: SADIE Prescribed on: Thu, Jan 15, 2026

Name: fusidic acid-hydrocortisone Topical Cream Strength: 2-1 %
Dose: 2 application(s) Frequency: PRN Duration: 14 day(s)
Label Instructions: Apply to affected area twice per day for 14 days
Quantity: 1 mg Refills: ☐ Auto Discontinue

Name:
Label Instructions:
Quantity/Duration: Refills: ☐ Auto Discontinue

Prescribed by: Lauren Miceli Pharmacy: <Enter search text or select from dropdown>

Cancel Draft Post Only Print Fax

Sample Gaze Concentration from Eye tracking Data during the Prescribing Process

Living Lab Methods: Eye tracking

The screenshot displays a medical software interface with a patient's medical history on the left and a prescription form for 'Five Testone' on the right.

Patient Information:

- Name: Testone, Five
- Address: 123 Test Road, Toronto ON, 416-555-5555(H)
- Birthdate: Sep 5, 2006
- Sex: F
- Health #: unknown; Not Rostered
- Last Billed: Never
- MD: other doctor: Test McTest
- Family MD: Test McTest
- age: 19-yr 35705 (#6754786)
- next visit: not booked

Medical History:

- Mother: Benign Hypertension
- appendectomy
- Aspirin-> Malignant Hyperthermia
- ? Food: Peanuts, Tree Nuts, Soybean
- Document Physical Activity in the Risk field
- Consider offboarding from CRC
- Last CPX: or Feb 9, 2015
- Last Flu Shot: Dec 4, 2015
- Last Mammogram: Last Pap: Other Report: Last Pap
- Last BMD: Last Colonoscopy
- SOAP Phone Call Virtual Signature Up to Date Dynamid e-D
- HPV: never done
- Mammogram: never done
- Colonoscopy: never done
- FIT/FOBT: never done
- BMD: never done

Prescription for Five Testone:

- Patient: Five Testone
- age: 19 years
- wt: 15.0 Kg (Feb 12, 2012)
- on never recorded
- eGFR: never recorded
- ODS: SADIE
- Prescribed on: Thu, Jan 15, 2026
- Name: fusidic acid-hydrocortisone
- Dose: 2 application(s)
- Frequency: [dropdown]
- PRN: ☐
- Duration: 14 day(s)
- Strength: 2-1 %
- Label Instructions: Apply to affected area twice per day for 14 days
- Quantity: [dropdown] mg
- Refills: ☐
- Auto Discontinue: ☒
- Quantity/Duration: [dropdown]
- Refills: ☐
- Auto Discontinue: ☐

Prescription Details:

- Start: propanolol 25 mg 1 time daily, PRN for 30 days
- No interactions guaranteed by user.
- Renewal: propanolol 25 mg 1 time daily, PRN for 30 days
- No interactions guaranteed by user.
- Jan 15, 2026
- Pt presents with worsening migraine over last 2 days
- sensitivity to light
- no allergies
- denies vision or hearing loss
- pain mostly in temporal region rated at 7/10 pain
- allergy to NSAOD
- denies tachycardia and chest pain
- no neck pain, no coughing, no SOB,
- some aura, tingling
- prescribed propanolol for migraine prophylaxis taken daily, return after 30 days

Prescription Form:

- Prescribed by: Lauren Miceli
- Pharmacy: [dropdown]
- Buttons: Cancel, Draft, Post Only, Print, Fax

Sample Focus Visualization from Eye tracking Data during the Prescribing Process

Types of Projects

1

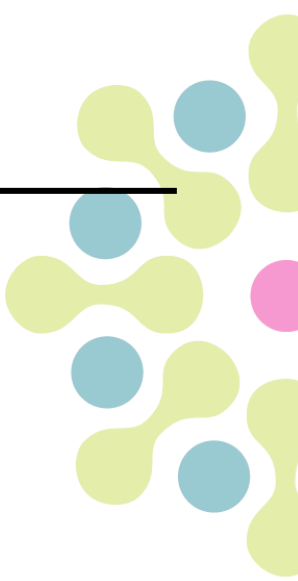
Evaluate Existing Tools

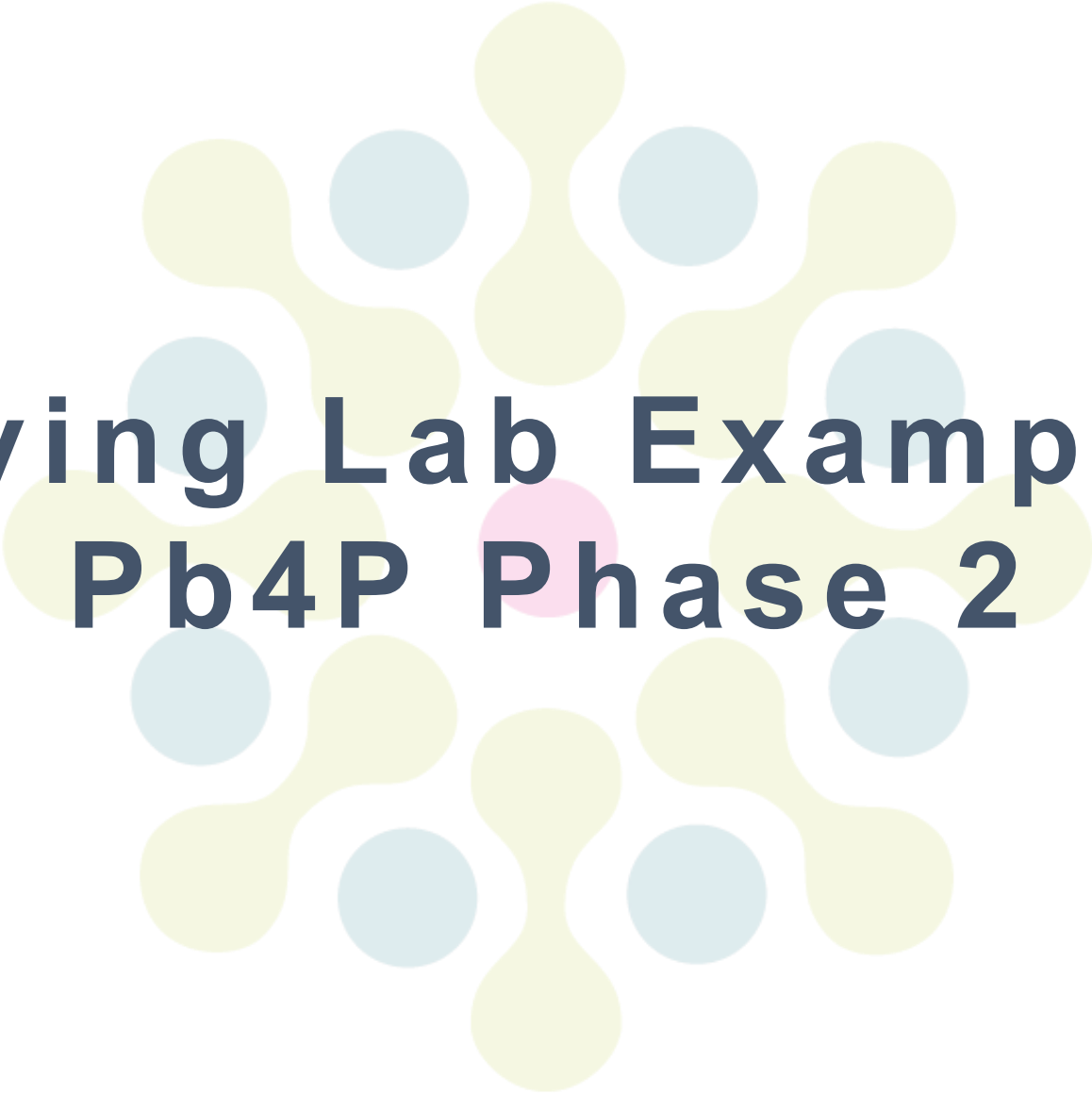
2

Pilot New Technologies

3

Suggest what needs to be built





Living Lab Example: Pb4P Phase 2

See Report Here:

https://cdhe.wchvihv.ca/assets/themes/cdhe/PDFs/Final%20Report_PB4P2%20-%20FINAL%2030SEPT24.pdf

Example: Patients Before Paperwork Phase 2



**Simulations in Virtual Care
Lab at WCH**

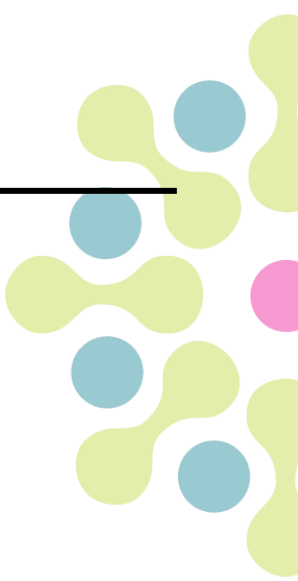


**Observations in 2 primary
care clinics**

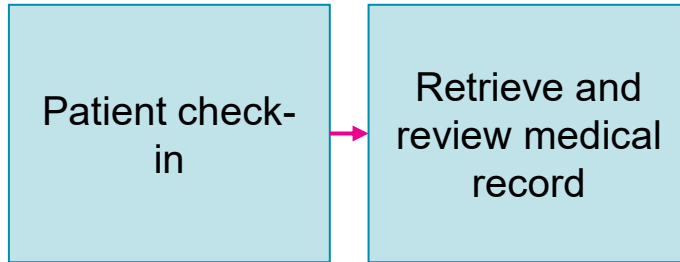


- 3-4 key use cases (prescriptions, incoming documents, referrals, lab requisitions)
- Compare fax-based to digital workflows to quantify administrative burden

Patients Before Paperwork: Phase 2

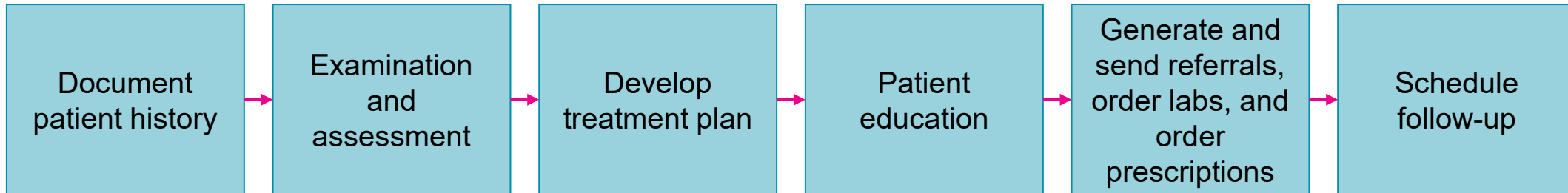


Pre-visit

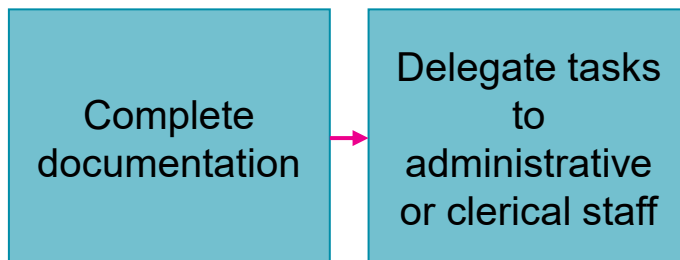


Patient visit

ENCOUNTER



Post-visit



Patients Before Paperwork Phase 2: Referral Workflows

(simulations)

TIME SPENT ON GENERATING AND SENDING REFERRALS

Patient Case	Referral Workflow						Difference [¥]
	eReferral [†]		eFax [‡]		Paper [§]		
	Mean [±]	SD	Mean [±]	SD	Mean [±]	SD	
Patient Case Complexity							
Simple	2 min 38 s	0 min 37 s	—	—	2 min 53 s	1 min 3 s	−8.7%
Complex	3 min 8 s	1 min 28 s	3 min 49 s	1 min 39 s	—	—	−17.9%

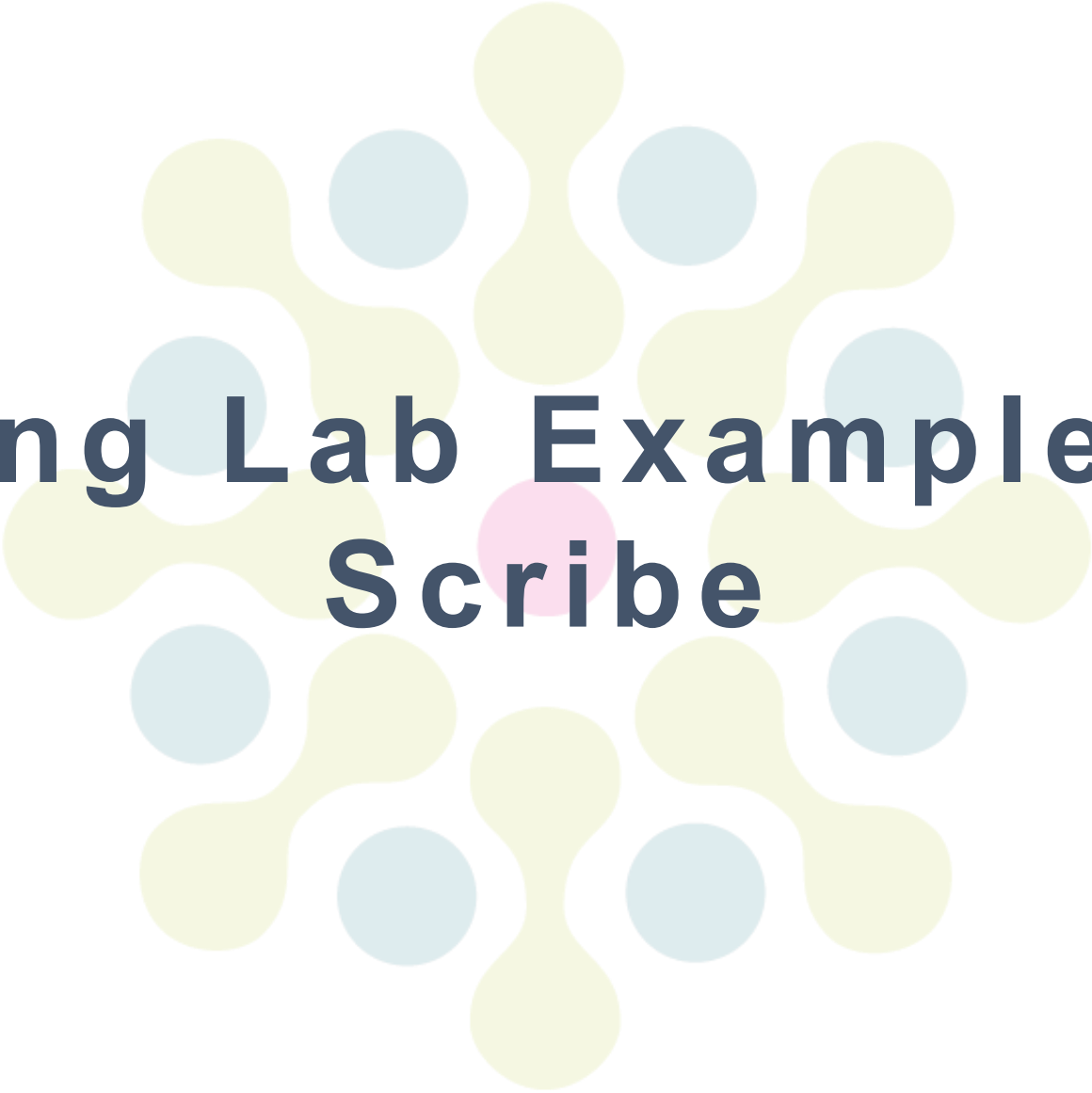
[†]Amount of time spent generating and sending a referral using Ocean eReferral.

[‡]Amount of time spent generating and sending a referral using eFax.

[§]Amount of time spent generating and printing a referral prior to hand-off to an administrative, clerical, or referral support staff member for sending (via fax or mail).

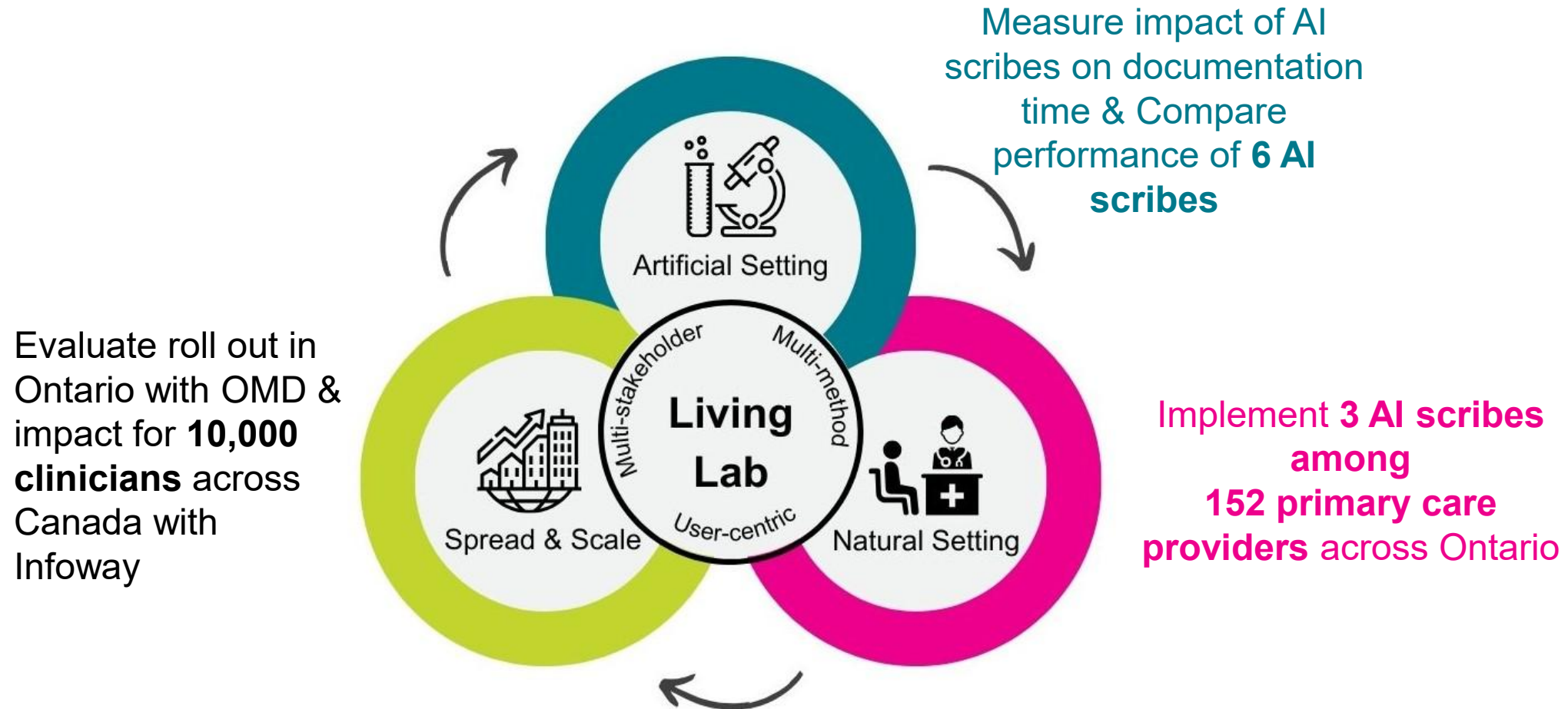
[±]Amount of time averaged across all simulated clinical encounters and PCPs.

[¥]Percent difference is calculated using the alternative method as the reference. A negative percent difference indicates that eReferral requires less time than the alternative method (i.e., eFax, paper) whereas a positive percent difference indicates that eReferral takes more time than the alternative method. The differences observed in this study were not statistically significant ($p > 0.05$), likely due to the small sample size.



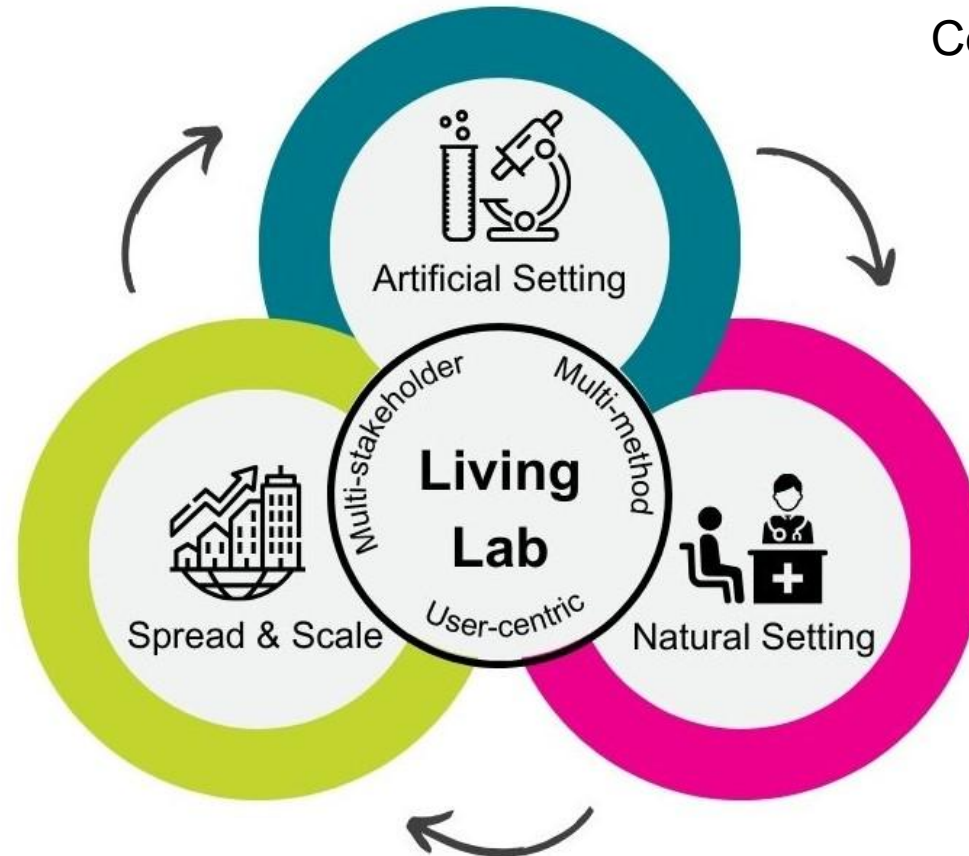
Living Lab Example: AI Scribe

Proof of Concept - AI Scribes



Next phase – AI Clinical Decision Support Tools

Determine value for
providers and
payers



Create quality metrics +
Compare performance of
9 AI CDS

Implement several **AI CDS**
in partner clinics

Living Lab Vision

Understand “jobs to be done” in primary care by staff, patients and caregivers

Test tools in simulation against jobs

Implement multiple tools in partner clinics

Assess impact on workflows for everyone



Next Steps



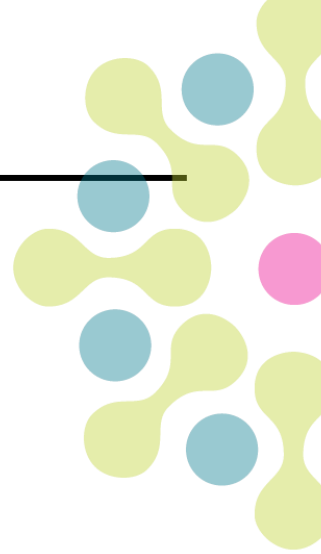
Strengthen infrastructure



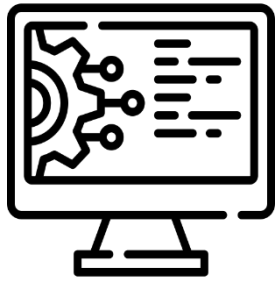
Continue building relationships with partner sites



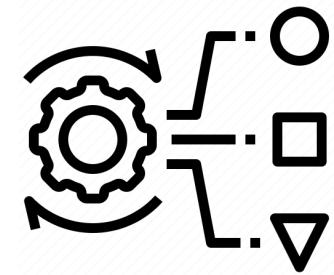
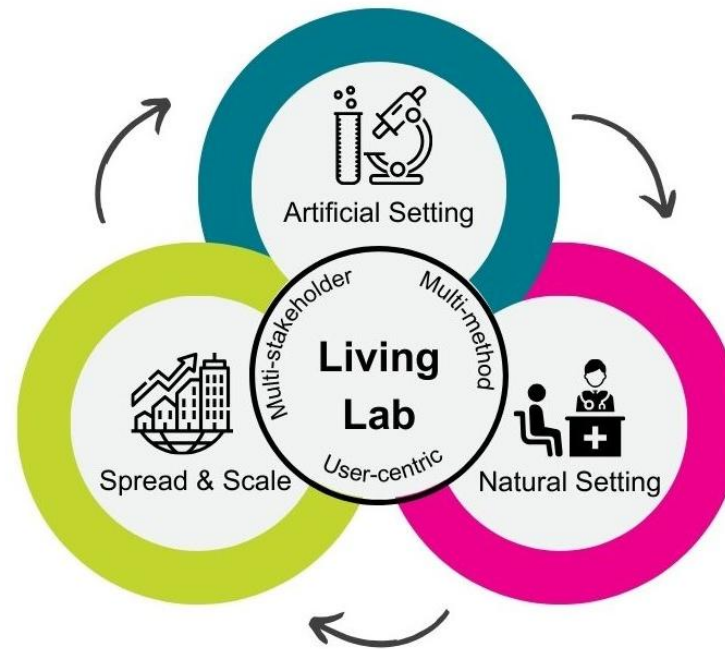
Identify use cases based on federal and regional needs to promote shared learning



Redefine what medicine could be and how we could get there



**Build better
tools**



**Reimagine
the work**



Appendix

What is Desirable? Jobs to be done

Primary Use Cases: Diagnosis, Prevention & Treatment



Diagnose & Manage Patients

Conduct examinations, order tests, interpret results, and develop treatment plans for a wide range of acute and chronic conditions.



Deliver Preventative Care

Educate patients on healthy lifestyles, administer vaccinations, and conduct screening to proactively maintain health and prevent disease.



Chronic Disease Management

Develop long-term strategies for patients with ongoing conditions, focusing on stability and quality of life.



Administrative Tasks

Handle patient records, large volumes of consult notes, insurance forms, billing, and scheduling, ensuring efficient operation of the practice.



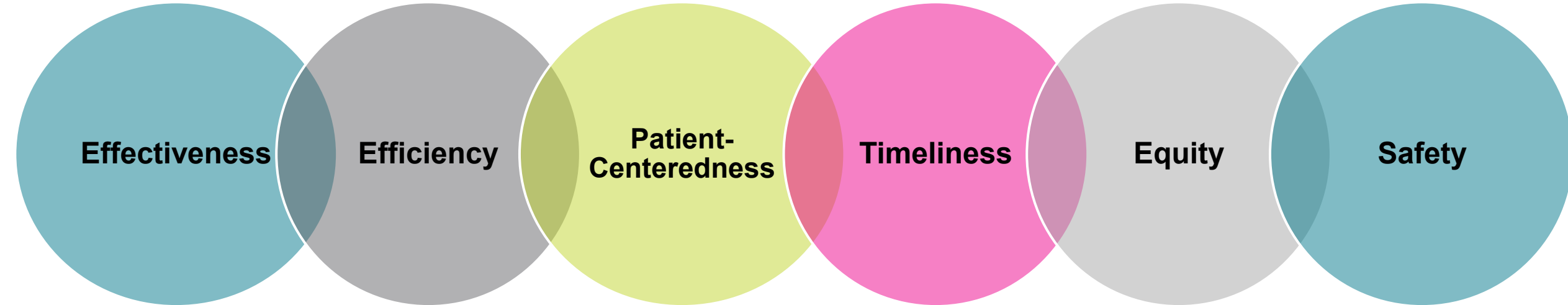
Patient Relationships

Build trust and rapport with patients, fostering open communication and a continuous care partnership.

Incorporating the 6 Domains of Healthcare Quality into the Living Lab

The six domains of healthcare quality—**safety**, **effectiveness**, **patient centeredness**, **timeliness**, **efficiency**, and **equity**—were originally outlined by the Institute of Medicine (IOM) in its seminal 2001 report, *Crossing the Quality Chasm: A New Health System for the 21st Century*. These domains have since been widely adopted by organizations to guide quality improvement and evaluation efforts in healthcare settings.

Digital tools evaluated through the WCH Living Lab will look across these 6 domains:

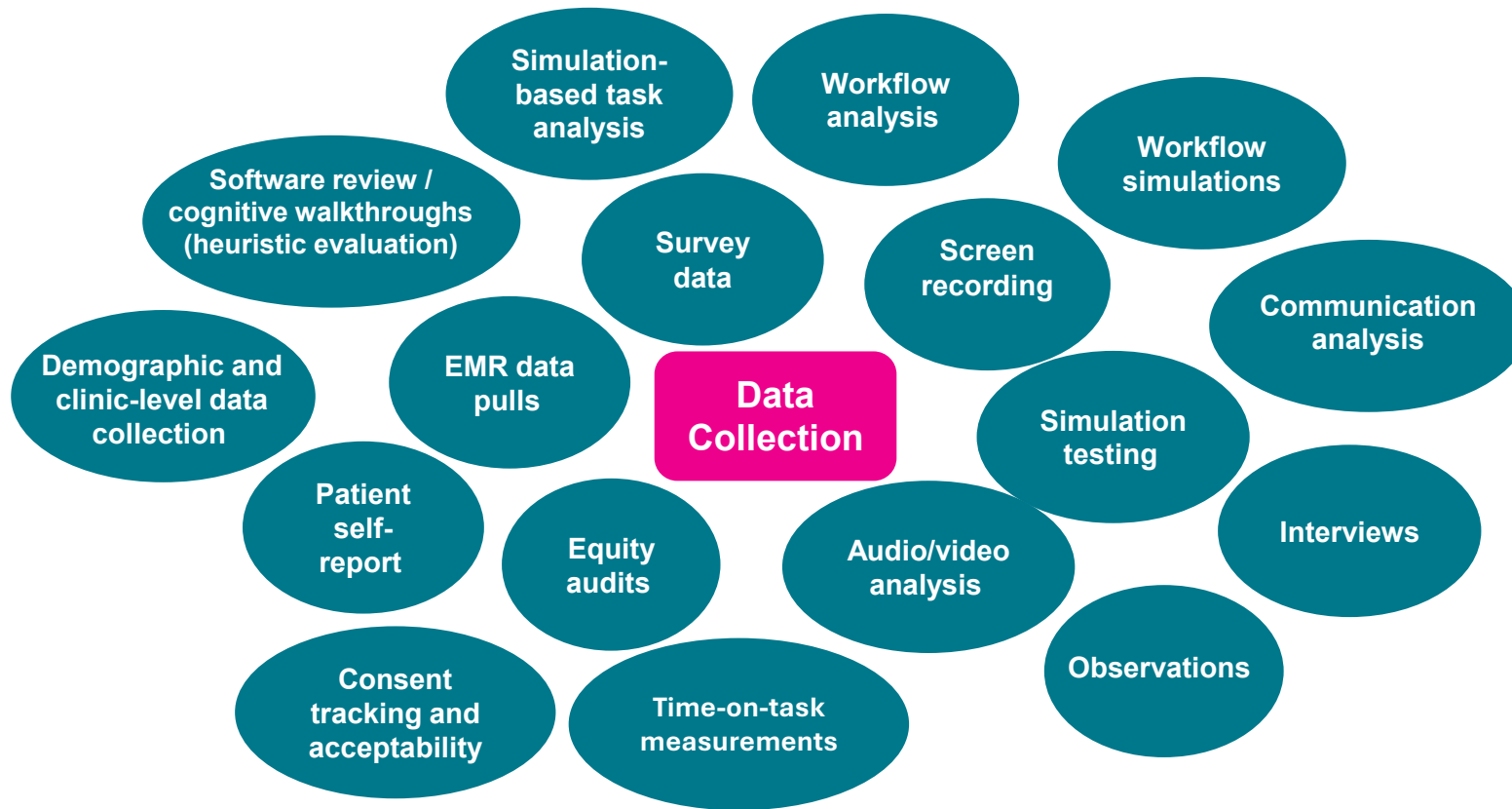


*See Appendix **C1-C6** for an overview of each domain

Institute of Medicine (US) Committee on Quality of Health Care in America., 2001

Methods in the Living Lab based on the 6 Domains of Healthcare Quality

The choice of method often depends on the goal of the evaluation, resource availability, and whether the tool is already in use or still in development, with many evaluations benefiting from a **hybrid approach** that triangulates data across multiple methods. For instance:



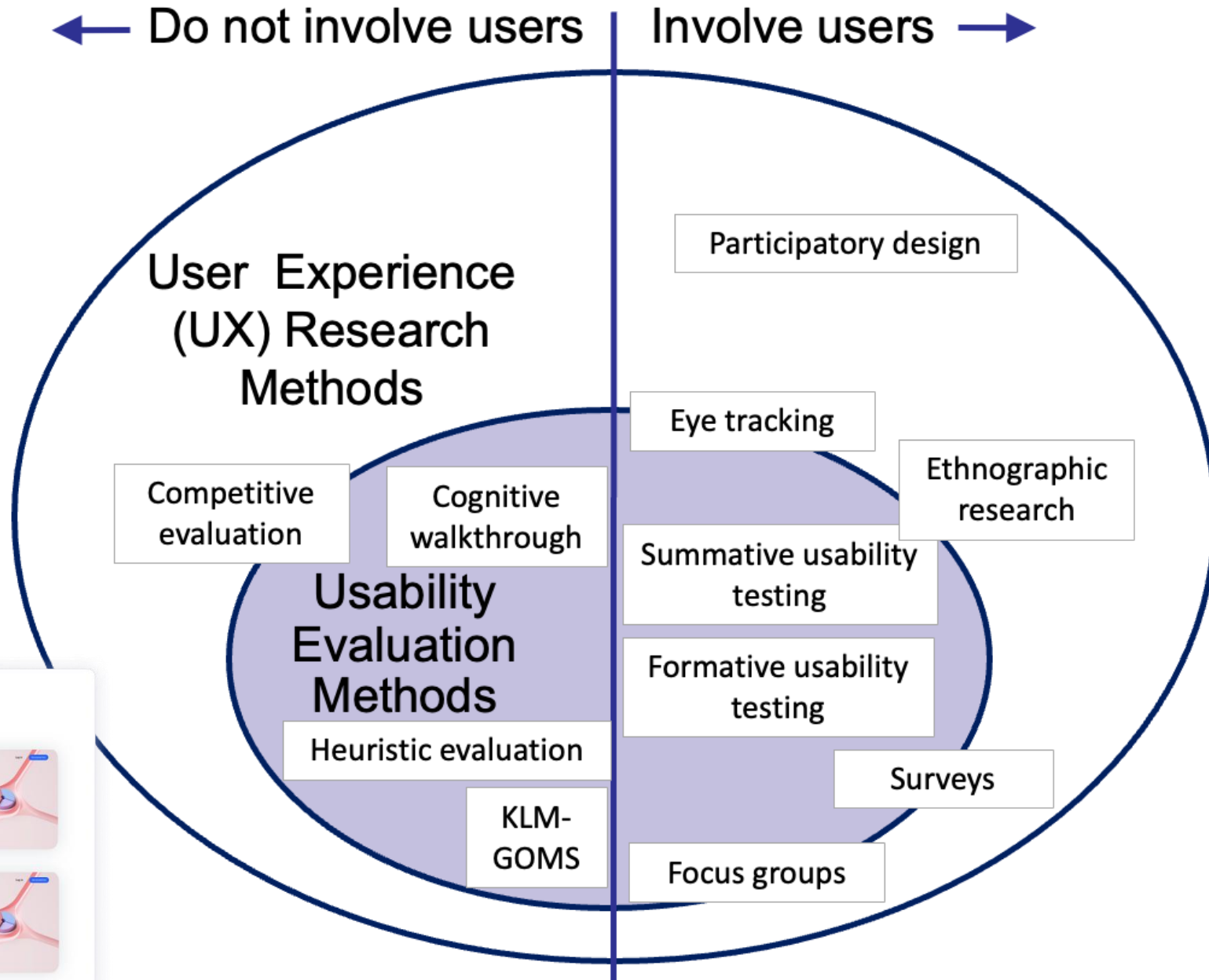
Interviews and surveys can capture perspectives on acceptability, experience, and equity-related concerns, including whether diverse patients feel supported or face barriers to consent or use.

EMR data pulls and Human Factors Data (e.g., eye-tracking, clicks, timestamp analyses, behavioural coding etc.) are especially useful for evaluating timeliness and documentation patterns.

*See Appendix **C1-C6** for an overview of each method

²⁴Institute of Medicine (US) Committee on Quality of Health Care in America., 2001

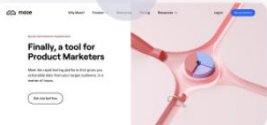
Usability methods



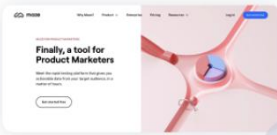
Versioning



VS



Multivariate testing



VS

