Reduce Risk in Computer Vision Design:
Focus on the User Experience

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twisthink

Reduce Risk in Computer Vision Design

Clarity Reduces Risk

- Know real problems people will pay to have solved
- Effectively weigh options and constraints
- Create optimal and novel solutions

Risks

- Over/Under design – many variables at play
- Build the wrong thing – lots of solutions looking for problems
- Poor user experience – too complicated or unreliable

Reduce Risk in Computer Vision Design

"By all accounts, Google Glass failed to gain commercial success.
Just to be clear, Google Glass didn't fail because of the technology, rather because **it wasn't clear** to the customer **what problem it solved** or **why they needed it**."

Forbes

Why Focus on the User Experience

Users have the needs and problems we aim to solve

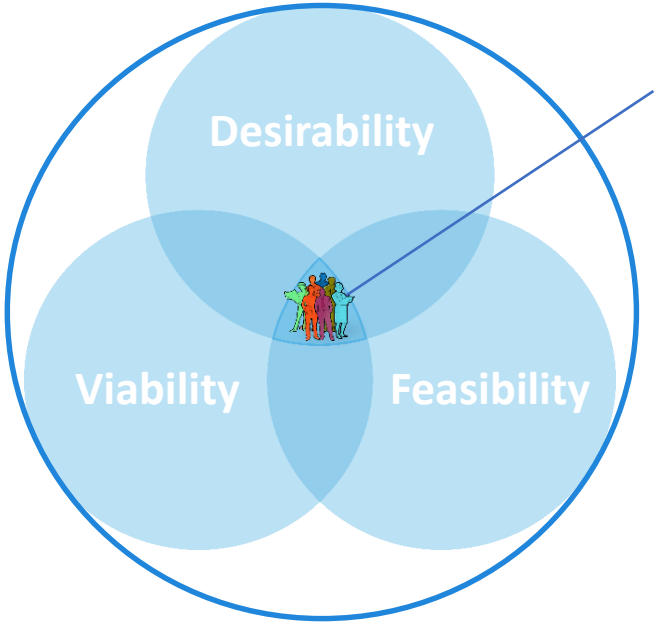
Users set the price for solving those needs

Users' contexts and capabilities limit solution configuration

Start with the answers

Balancing Three Lenses

What does the user need?



Successful designs

Is there a viable business?

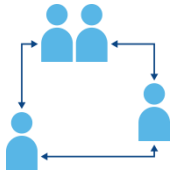
Are the needed capabilities feasible?

Human Centered Design

HCD is both a **mindset** and **process**
for problem solving that puts the user at the heart of development efforts

Focus on the Users

Balance 3 lenses



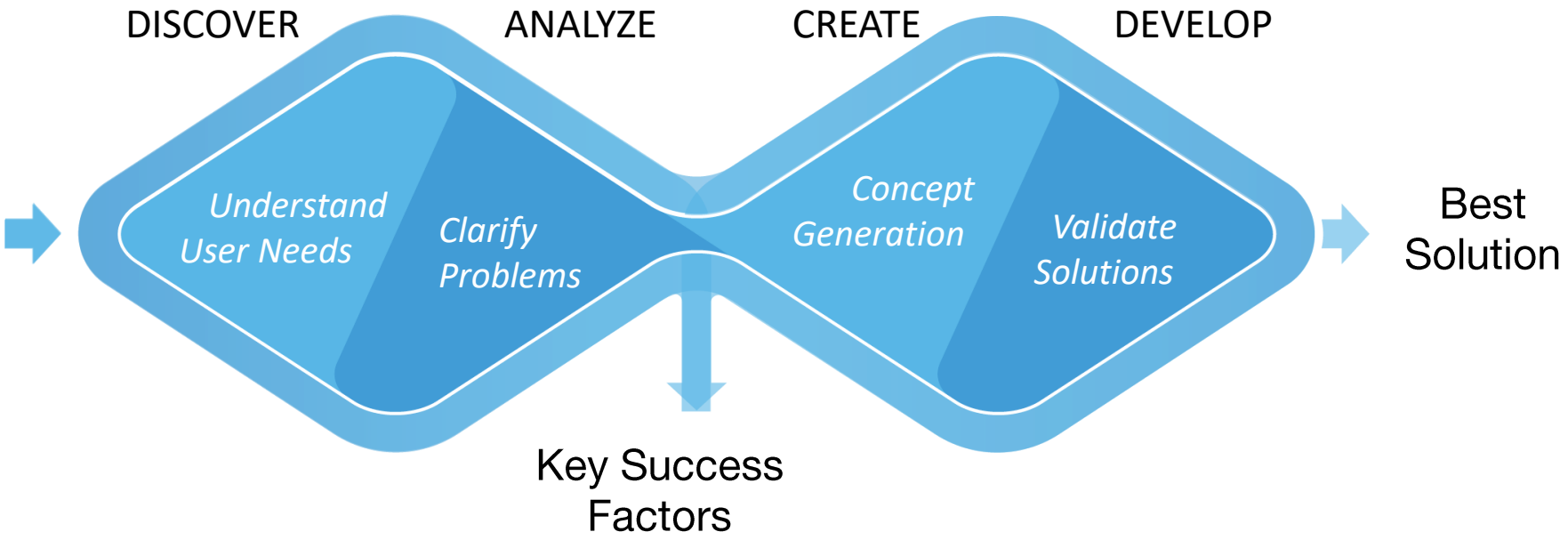
Embrace Collaboration

Experiment and Iterate

"Get closer than ever to your customers. So close that you [can] tell them what they need well before they realize it themselves" - **Steve Jobs**

Human Centered Design

A progression of development stages and tools



Tools available on our website

Wearable Connected Camera

Perceived Needs:

High Fidelity Documentation
Local & Remote Collaboration

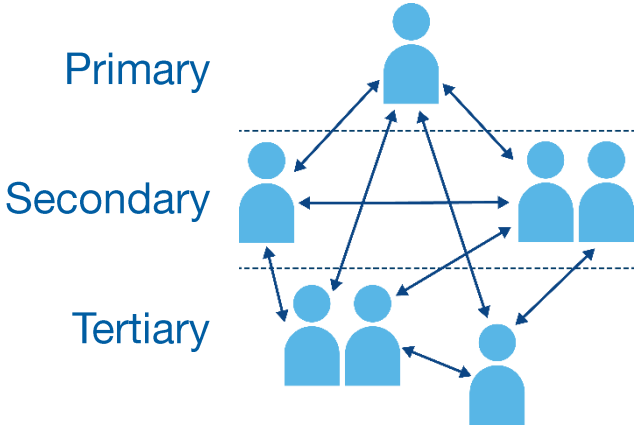
Proposed Solution:

Wearable Connected Camera System

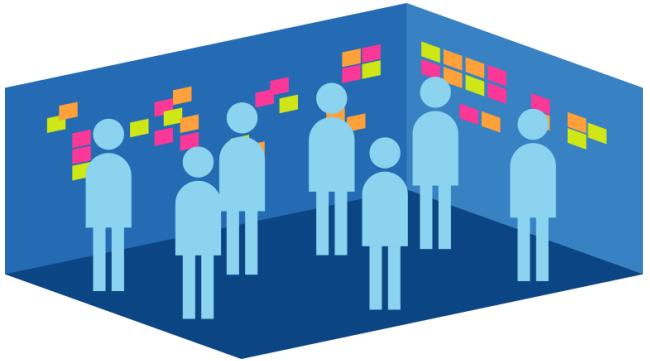
Framing Question:

What is the best vision system experience for critical environments?

Understand critical worker's environments and the needs they have



Stakeholder Mapping

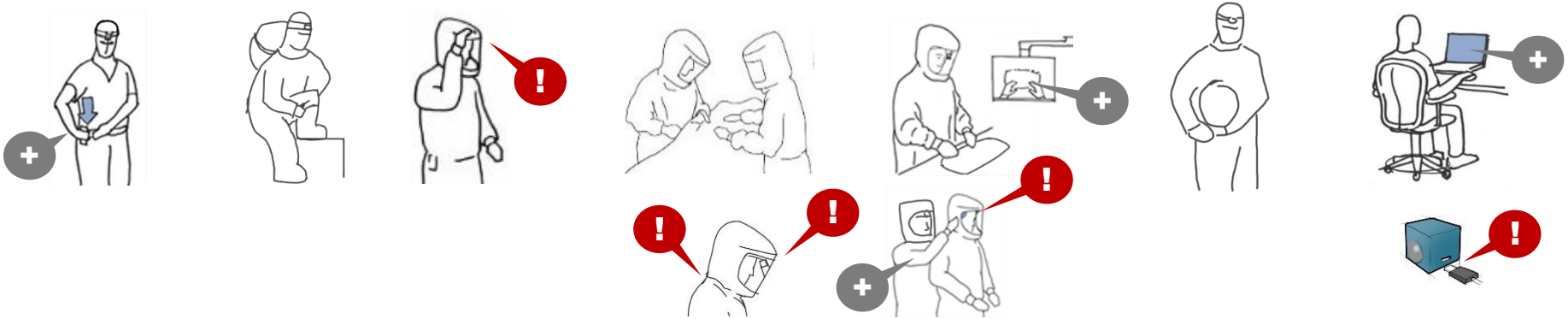


Journey Mapping Workshop

Clarify & define real problems and opportunities

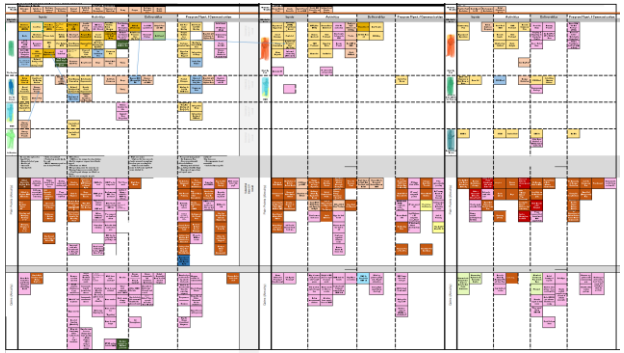
Journey Map

System Prep → Suit Up → System check → Action → Suit Down → Post Processing



Translate problems and opportunities into prioritized design goals

Journey Map of needs



Affinity Mapping

Key Success Factors reduce risk:

- Empower smart, multifactor technology tradeoffs
- Clarify what success looks like
- Links tech value to user value

Key Success Factors

Imaging system

1. Max image quality (digital zoom)
2. Minimize size and weight

User Controls

1. Keep to minimal – simple
2. Accessible to support team

User Feedback

1. Minimally distracting
2. User first and foremost

Data Management and Delivery

1. Full resolution storage
2. Meet security standards
3. Keep it simple
4. Operator always has control

Connectivity

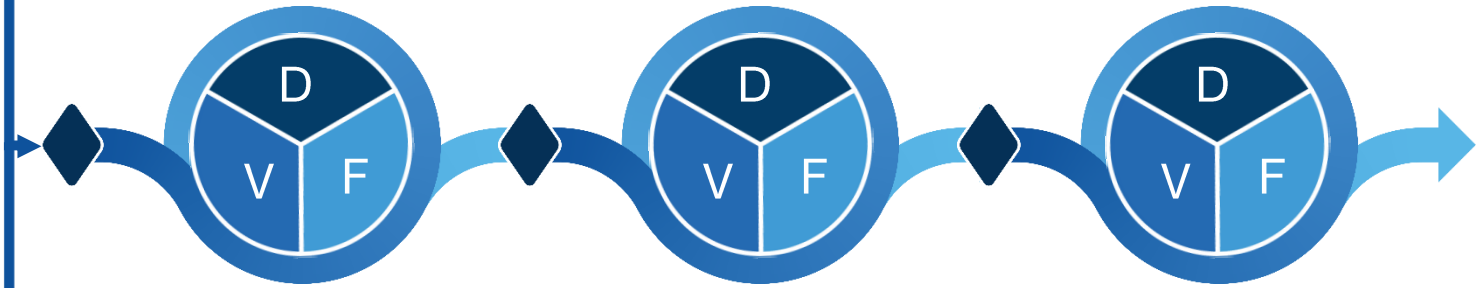
1. Minimize live latency
2. Lower res allowed on live displays
3. Simple commissioning

Collaboration + Iteration = Optimum Technology Solutions

Key Success Factors

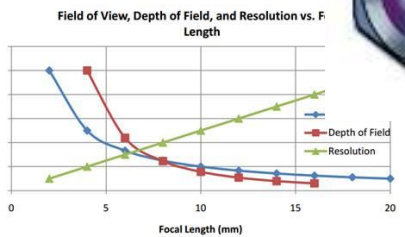
User Needs

Cross Functional Team



Camera Resolution

Alignment & DOF



FOV/DOF Study

Download UX

LITY	HRS.	FILE SIZE (GB)	USB 2.0 (min)	USB 3.0 (min)	USB 3.1 (min)
30	4	108	50.00	7.20	2.88
24	4	108	50.00	7.20	2.88
1080p60	4	81	37.50	5.40	2.16
1080p30	4	81	37.50	5.40	2.16
720p60	4	45	20.83	3.00	1.20
720p30	4	45	20.83	3.00	1.20

File Transfer Study

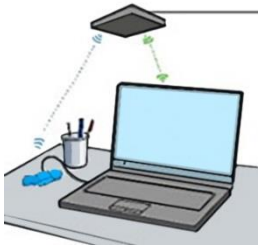
Postprocessing UX

Customize camera for maximum stored image resolution, leverage COTS

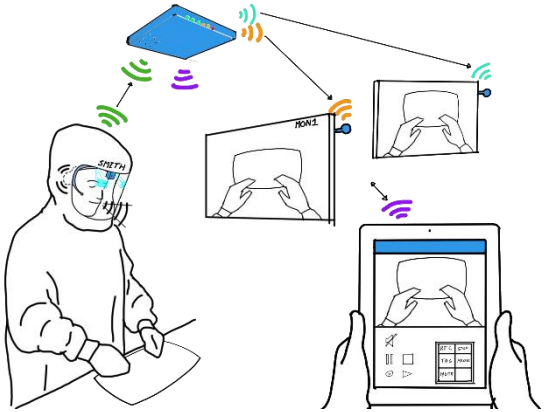
Camera Compression

	Bluetooth	ZigBee	Wi-Fi	Wi-Fi	WiGig	WHDI	WiHD
IEEE Standard	802.15.1	802.15.4	802.11n	802.11ac	802.11ad	n/a	802.15.3c
Frequency	2.4 GHz	900 MHz / 2.4 GHz	5.1 - 5.8 GHz	5.1 - 5.8 GHz	57 - 66 GHz	5.1 - 5.8 GHz	57 - 66 GHz
Maximum Bit Rate	1 Mb/s	250 Kb/s	450 Mb/s (typically much slower)	1 Gb/s	> 1 Gb/s	1080p over 40 MHz, 720p over 20 MHz	Up to 28 Gb/s on all four channels
Nominal Range	30 feet	30 - 300 feet	300 feet	300 feet	30 feet LOS	Up to 100 feet	30 feet LOS
# of RF Channels	79	1/10, 16	24 with DFS/TPC	24	Multiple	24 with DFS/TPC	Multiple
Channel Bandwidth	1 MHz	.3 - .6 MHz, 2 MHz	20 MHz (unpaired)	Up to 160 MHz (paired)	2.16 GHz	20 MHz (720p) 40 MHz (1080p)	2.16 GHz
Modulation System	GFSK	BPSK, QPSK	OFDM	OFDM / 256 QAM	OFDM	OFDM	OFDM / 256 QAM
Suitable for Wireless Display?	No	No	No	Yes	Yes	Yes	Yes

Wireless Standards Study



Commissioning UX



Local / Remote Network UX

Defined two technology user experiences to be tested

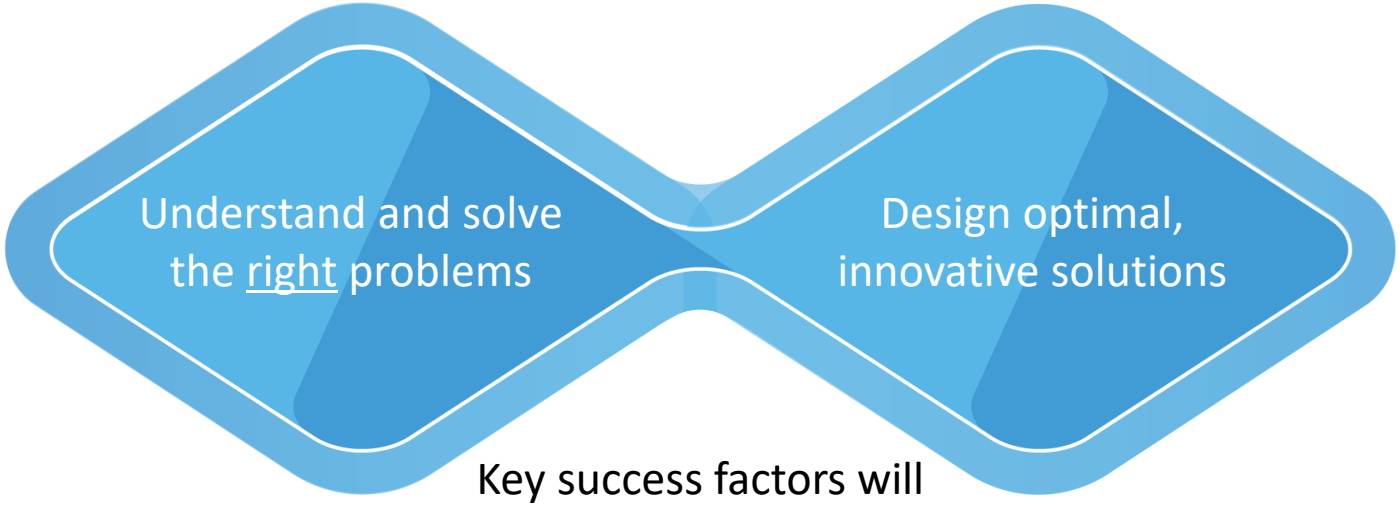
Validate best solution(s) before committing to development

3 Personas

Medium Resolution VRT

Conclusion

Focusing on the user experience with HCD…



Key success factors will empower smart trade offs

…results in successful computer vision designs!

Twisthink – Booth #109

Leading business through the art + science of what's next

Human Centered Design | Embedded Vision | AI | Connectivity | Internet of Things | UI / UX

Resources

101 Design Methods Book

www.twisthink.com/embedded-vision-summit

- Download Presentation
- Download HCD Process and Tools