



HSR: Health - Sense & Respond
An Action Support System For Nurses



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HSR: Doing More with Less Information



HSR – “Health Sense & Respond”

HSR is what Semantrix believe medical decision support systems will look like over the next decade.

- Future hospital systems will actively monitor your patients location, state and the hospital environment around them.
- Smart phones and iPads are ubiquitous and will provide staff with their patients current state, scheduled treatment plan activities, and diagnostics in real-time.
- **High quality, relevant information made available to medical staff next to the patient - translates to more informed decisions - delivering better patient outcomes.**

HSR: Doing More with Less Information



Managing Today's Hospital Workloads

- People can focus on 3-5 things at a time – a busy nurse might have 50 activities to keep on top of
- Next Generation Action Support Systems like HSR will help- and can handle 1000's of activities!
- HSR delivers less information– based on context it delivers just what is needed for the current task
- Complete access is still available.


In future - decision support must be Real-time & Location-Aware

- Identify patients physical location to manage movements
- Monitor patient sensors, trends, diagnostic & treatment updates, and behaviours in real-time – notifying staff of issues, etc
- Centralise patient info - Ensure the next shift is aware of issues, negative trends, new test results
- Provide portable info on patients in the palm of your hand, through a smart phone, or iPad
- Location and task-awareness– knows where and what you, your patients, doctors are doing- and how to help!

Real-time, Location Aware, Decision Support Will Improve Patient Outcomes

- Benefits to:
 - Patients
 - Nurses,
 - Doctors,
 - Administrators
- Filtering out all but the info relevant to the task at hand for staff
- Robust & reliable – patient care is positively impacted !

HSR: Doing More with Less Information: Smart Health System Benefits



Patient Behavioural Monitoring

- Use 3D Vision systems & sensors for patient monitoring
- Determine patient status, & monitor patient activities and patterns of behaviour:
- Automatically identify dangerous situations and behaviours and trigger response

Falls detection & prevention

- **Based on patient state, typical behaviour and postural patterns - flag unstable patients at risk of falls quickly – send help before fall occurs**
- **Provides risk detection and incident response in real-time.**
- Detect if unsteady on feet, holding furniture to stay upright, moving in the dark
- Identify when a patient is a falls risk or is lying on floor - send help immediately

Track & Monitor Patient Activities & Status

- Track - Walking, exercising, sitting reading, meals, etc.
- Identify patients exhibiting – unsteady stance, agitated or unusual behaviours, wandering, signs of dementia, poor sleep patterns -long periods of sitting standing, lying, on toilet, lost in the dark
- flag unauthorised people entering single patient rooms & call security
- HSR delivers electronic vs. Physical patient tracking – a tool to improve capacity

HSR: Doing More with Less Information: Proximity, Patients, & Treatment Timelines

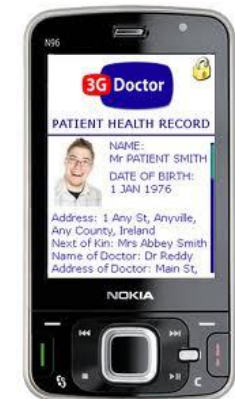
Patient NFC wrist tag

- Read via staff mobile phones – can access Biometric Identity, Patient Health Record, Treatment Timeline, scheduled activities, all related diagnostics, trends, and hand-over information.



“Multi-tags” – combine NFC, RFID, Zigbee

- allow staff to “swipe and access info”, determine patient location to ½ m in hospital, beep, flash, or display message to request “return to room”, “goto x-ray dept” , etc.



Event Management & “Co-incidental Optimisation”

- HSR know whats happening, where people are – and can ask the nearest appropriate staff resource to respond



HSR: Doing More with Less Information: Patient Information at your Fingertips

Real-time Sensor & Information Distribution

- HSR integrates all hospital sensors, patient, specific day-to-day, staff rosters and schedules into its core.
- Dynamically Find, links, and “dynamically publishes” all relevant patient related information, PHR, and any external sources



Secure Mobile Access To Patient Info - At Your Finger-tips

- HSR – makes Patient info, treatment plans available through mobile devices “literally next to the patient”
- Range of Security options: access protected by Biometrics including Fingerprint Scanners, Face & Voice Recognition, your staff “multi-tag”



Highlights & Monitors Patient Safety Issues

- HSR analyses a patients condition & Treatment Timeline
- HSR will display contra-indicators, allergies, shift hand-over info, patient stats vs. age, trends in stats, etc
- Monitors in real-time, identifies falls risks, patients on floor, etc



HSR: Doing More with Less Information: Multi-Tags, Location & Identification



New types of wireless tags: NFC, RFID, ZigBee

- NFC wristband identify patient and enables info access
- RFID locates patient in room
- ZigBee Wireless Mesh locates patient in hospital



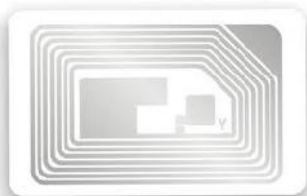
Mobile NFC Enabled Handheld Devices Becoming Ubiquitous

- 70% of Mobile devices like a Smartphone's or iPad are predicted to be NFC enabled in 2 years



Semantrix “Multi-Tag” concept - combines 3 tags into one for patients & staff

- NFC Patient wristband - Swipe phone for details
- RFID tracks room entry
- ZigBee tracks patient location and provides: Beep, Message Display, Emergency Call Button

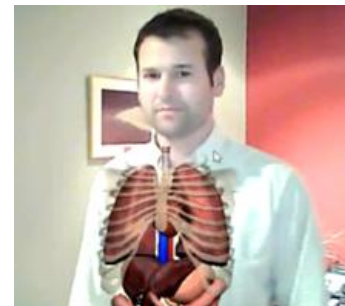


HSR: Doing More with Less Information: Augmented Reality on Mobile Devices

Mobile Devices can show diagnostics, X-Rays, etc. as Augmented Reality Overlays over the bodies

Additional info – handover comments, issues - can be seen overlaid over a patient when viewed through phone camera

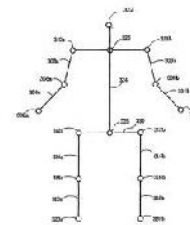
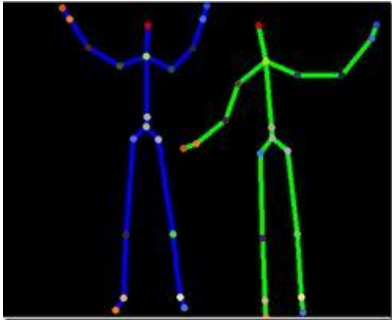
Patient Diagnosis and Treatment Info at your Finger-tips via HSR “Treatment Timeline” – swipe Patient NFC Tags for access



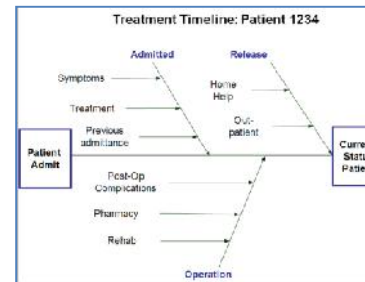
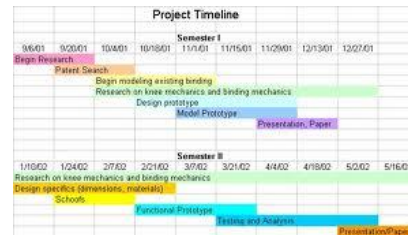


Patient Behavioural Monitoring using 3D Ranging Vision Sensors

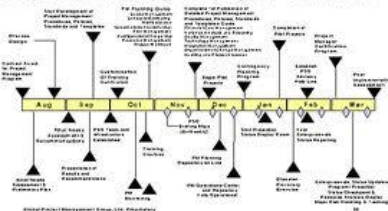
- ## Ranging Vision Sensors
- PrimeSense developed 3d sensors to monitor body movement - used by games like Microsoft's Kinect
 - Can identify "body model", posture, actions.
 - Can develop systems to recognise dangerous patterns – Patient is "Falls Risks", "Agitated", etc
 - Link with Face recognition and NFC / RFID tags to check / confirm identity and location access rights



HSR: Doing More with Less Information: Patient Health Records & Treatment Timelines



Sample Global Advantage One Program - Deliverables



Treatment Timeline

- Timeline shows all patient related events & information
- Captures patient arrival, diagnosis & treatment activities, attending staff, patient stats over time, diagnostics, etc

Automated Patient Info Publishing

- Finds & links Patient Health Record with other relevant patient related information - using "dynamic publishing"
- Able to link "all" external info like patient gym info, etc

HSR logs all patient status, activities & info in real-time

- HSR integrates all hospital sensors & Patient Info sources at your finger-tips in real-time
- Supports shift hand-over info, patient health trends, etc



HSR: Doing More with Less Information

Scenario 1: Neo-natal care – 2 Babies

You're monitoring two babies in the neonatal room:

Baby-Jack has minor breathing issue, Baby-Anne was born premature

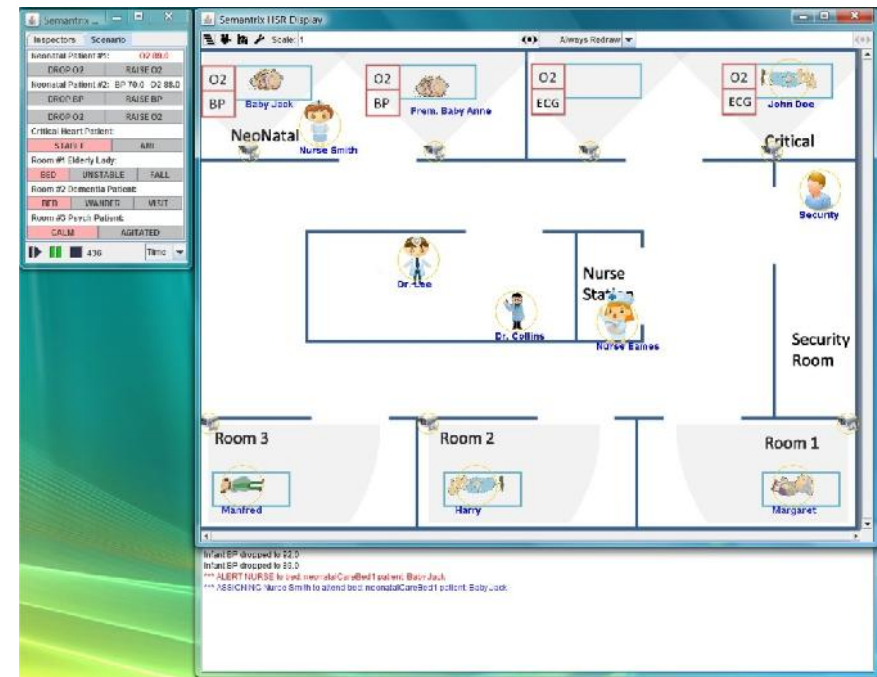
We have a vision which looks like this - you specify “Conditions of Interest” to the HSR system – describing the scenario of interest and appropriate responses:

Case 1 -Baby Jack O2 drops

- Call Nurse if Baby-Jack has $O_2 < 90\%$

Case 2 -Baby Anne - first O2 , then O2 & BP drops

- Call Nurse if Baby-Anne has $O_2 < 75\%$ or $BP < 60$ mm/hg
- Call Nurse and Paediatrician if Baby-Anne has $O_2 < 75\%$ and $BP < 60$



HSR: Doing More with Less Information

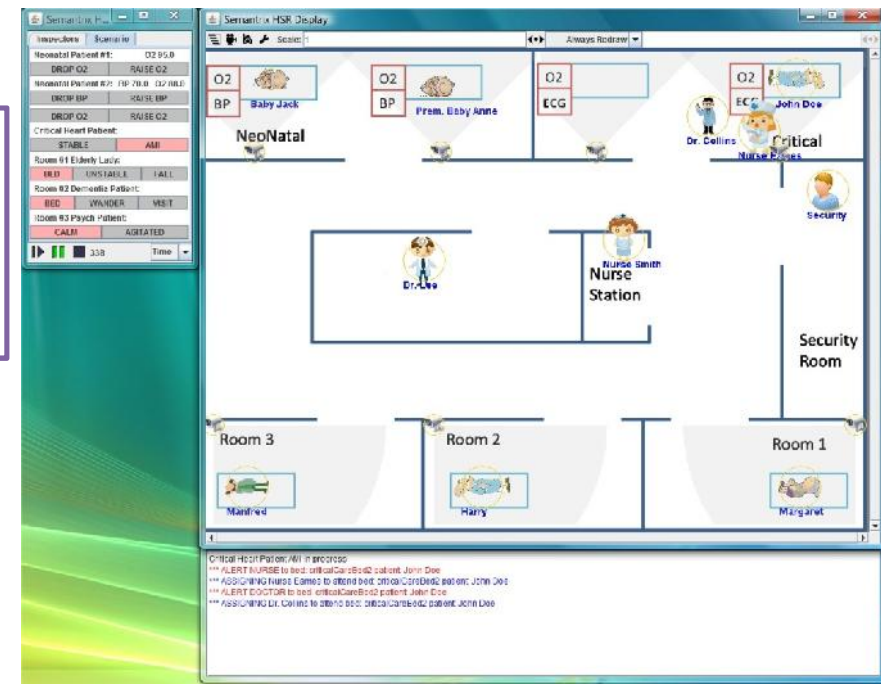
Scenario 2: Critical Care Heart Attack Patient

Patient John-Doe is in Critical Care after a heart attack. He has an ECG sensor monitored by HSR – which can identify an AMI (Acute Myocardial infarction)

If John Doe's ECG indicates an AMI episode, then call Doctor & Nurse to treat and stabilise him

Case – an AMI occurs

- Call Nurse and Doctor if Patient John-Doe has ECG = AMI-Detected



HSR: Doing More with Less Information

Scenario 3: Aged care – Falls Monitoring

Your patient is Margret an Elderly Lady – who has a history of Osteoporosis and is unstable - with a high falls potential. HSR is monitoring her with a 3D sensor

Also: HSR needs to send security if another patient enters her room at night. Dementia patient Harry - periodically becomes confused & believes her room is his.

Case - Margret becomes unstable

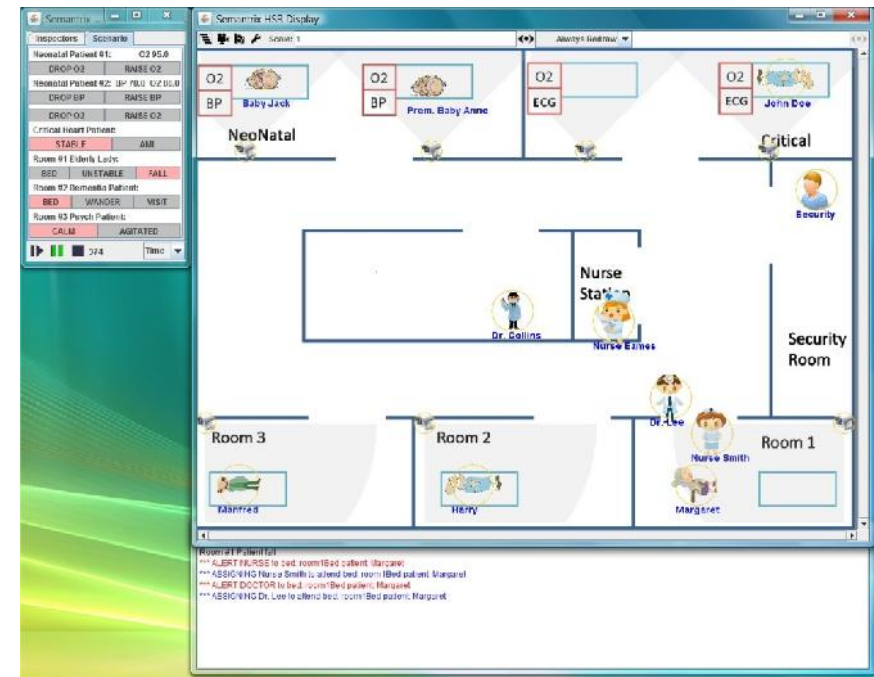
- Call Nurse if 3D-Sensor-RM1 indicates Patient-Margret is Unstable

Case - Margret Falls

- Call Nurse and Doctor if 3D-Sensor-RM1 detects Patient On-Floor or Has-Fallen

Case – Unauthorised-Patient

- Call Nurse and Security if 3D-Sensor-RM1 detects Unauthorised-Patient



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Scenario 4: Aged care – Dementia & Wandering

Your patient Harry – is a larger older man with dementia. HSR is monitoring him with a 3D sensor

Harry recently became confused & angry and entered another patient room - saying it was his. HSR needs to send security to help if he does this again.

Case – Harry Wanders Out Of Room

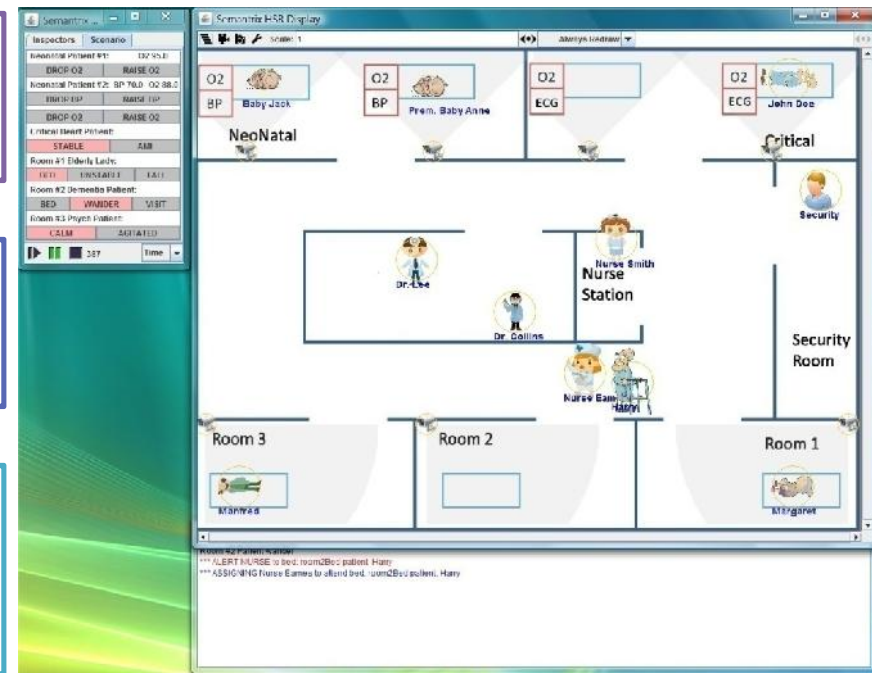
- Call Nurse if 3D-Sensor-RM2 indicates Patient Left-Room

Case – Harry Enters RM1

- Call Nurse and Security if 3D-Sensor-RM1 indicates Patient Harry Entered-Room

Note: Responses may be combined

- The Unauthorised access Col on RM1 would also respond – but both responses would be combined and only one Security Guard would be sent



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Scenario 5: Psychiatric Care - Behavioural Monitoring

Patient-Manfred is a Psychiatric Patient. HSR is monitoring him with a 3D sensor

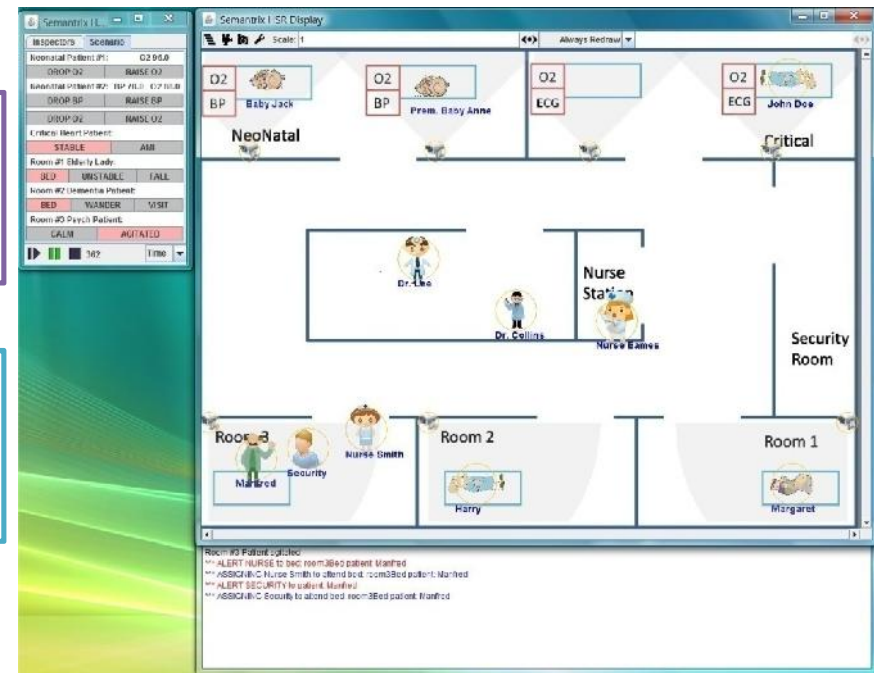
If Manfred becomes Agitated the Nurse and a Security guard need to provide medication. HSR needs to detect if Manfred is Agitated.

Case – Manfred Agitated In RM3

- Call Nurse and Security if 3D-Sensor-RM3 indicates Patient Manfred is Agitated

Case – Manfred Agitated Anywhere

- Call Nurse and Security if any 3D-Sensor indicates Patient Manfred is Agitated



HSR: Doing More with Less Information



One thing we can guarantee is that technology will dramatically change the way we manage patients and patient information in the near future.

With portable next-generation sensor technologies and personalised communication devices the interaction between patients, nurses, doctors and hospital and nursing home environments will be immediate, direct and highly interactive.

The future will have systems that are monitoring your patients activity, behaviour, their status and their environment - providing automatic notifications directly to you via your mobile phone or iPad of any new relevant information.

Higher quality real-time information being made directly available to medical staff - translates into more informed decisions - which will deliver better patient outcomes.

With Semantrix - the future is not that far away!

Semantrix: “Intelligent Information Access”



The core philosophy behind Semantrix is the delivery of “Intelligent Information Access”:

- Intelligent – as we lever new approaches to hide technologies and legacy systems, and to provide the Information the business requires, not just the data the IT department makes available.
- Intelligent Information – not just data, as we provide data context as well so the business is accessing knowledge not just data - delivering exactly what you need.
- Intelligent Information Access – To support business users by extracting meaningful information, and providing opportunities to explore correlated information that suits different users, across multiple systems, in ways not previously possible.

Leveraging Semantic Web and Artificial Intelligence technologies and approaches, Semantrix can federate and make siloed application data accessible, provide tailored interfaces adapted to *your business requirements*, and with the intrinsic flexibility of Semantic technologies add new data sources and extend business access flexibly and at low cost compared to the typical Enterprise Business Intelligence approaches.

To ensure success Semantrix have partnered with the most advanced Semantic product and services companies in the field:

- **TopQuadrant** - to exclusively sell and support their TopBraid products, services, and training in Australia- including TopBraid Maestro, Enterprise, Live & Production
- **Ontotext** – to sell and support their products and services including BigOwlIM & GATE/KIM

• Semantrix Business Services

- Product development and supply
- Project development, integration and deployment
- Specialist consulting services
- POC and Concept Demonstrators
- Product Support and Maintenance

• Semantrix Engagement Model

- Product Supplier (3rd party and bespoke)
 - Represent TopQuadrant & other Semantic Web Technology companies in Australia
- Project Contract
- Consortium Projects
- Specialist Consulting Engagements

Semantrix Products and Consulting Services


Strategic Information Planning, and Enterprise, Domain, & Solution Architecture consulting	Enterprise multi-media asset management and distribution systems
Semantic Technology, "Linked Data", and Web 3.0 Architecture consulting & development	Social network driven personalisation , VMS/DAMS recommendation, EPG systems
High Performance, high Volume Web Site Architectural consulting and development	Light-weight Semantic Content and Metadata Federation and Integration approaches
Semantic application consulting and development – including Ontology development, content management, and product construction & delivery	Enhanced user search using metadata and faceted Semantic and Commercial Search Architecture and development approaches
Knowledge-Based Systems consulting including Rules based systems, Expert Systems, and A.I technology application development	Semantic and Wireless sensor technologies to support Health Informatics
Automation approaches to apply Semantic and A.I. technologies to Search Engine Optimisation (SEO) - including Good Relation ontology applications for products and services marketing	Autonomous systems software design and development: Semantic Models, Navigation systems, Agent & rule based control & planning

Would you like more information? Please Contact:



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Intelligent Information Access

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